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THE Festivus

Vol. 54(1) February 2022

Quasimitra revisited - a synonym

New *Chicoreus* from Samoa

New marginellids and cones from South Africa

Cinctura, *Canarium*, *Amphidromus*, and more

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Staged photo of a living specimen of *Nataliconus immelmani alanfraseri* Seccombe & Aiken, 2022, taken by Valda Fraser in a salt water tank on March 15, 2021; photo used with permission. (Cover artistic credit: Rex Stilwill).

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On a supposed new species of *Quasimitra* (Gastropoda: Mitridae: Mitrinae) recently described from Indonesia: The birth of a new synonym

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ABSTRACT The newly described species *Quasimitra houarti* Dharma, 2021 from Indonesia is found to be a junior synonym of *Quasimitra stossieri* (Herrmann, 2016).

KEY WORDS Mitridae, *Quasimitra*, *Q. houarti*, *Q. stossieri*, Sumbawa, Indonesia

INTRODUCTION

A new species of *Quasimitra*, *Q. houarti*, was described by Dharma (2021), based on six specimens collected by a local diver from depths of 25-30 m, off Bungin Island, Northwest of Sumbawa Island, Nusa Tenggara Islands, Indonesia. Another specimen from the Sofjan Effendy Collection, dead collected, approximately twenty years ago, from Nusa Tenggara Islands, Indonesia (Dharma, 2021) was included in that paper. The new species was compared in the descriptive paper with *Quasimitra nubila* (Gmelin, 1791), *Q. lamarckii* (Deshayes, 1832), and *Q. hawaiiensis* (Kay, E.A., 1979).

Herrmann (2016) reviewed part of the genus (then still contained in *Mitra* Lamarck, 1798) and described a new species, *Mitra stossieri* Herrmann, 2016, from Indonesia, type locality: Indonesia, Bali, Sanur. Herrmann, 2016 gives the range from Bali and the Flores Sea in Indonesia, to the Solomon Islands and Tonga, and he illustrated the shells from the various localities: Paratype 1, Tonga, Vava´u, Umunak, 37.6 mm; Paratype 2, Solomon Islands, Marau, Guadalcanal, 50.3 mm; Paratype 6, Indonesia, Flores Sea, north side of Kaledupa Island, 34.3 mm.

I refer to Hermann (2016) for the plates containing other related species in this group: *Mitra propinqua* (A. Adams, 1853) and *Mitra brettinghami* E. A. Smith, 1906. Fedosov *et al.* (2018) include many other species in the (then newly erected) genus *Quasimitra*. The description of *Quasimitra* was based on only three species in the Bayesian phylogenetic tree of Mitridae (Fedosov *et al.*, figure 5): *Mitra sophiae* Crosse, 1862; *Mitra puntulata* Lamarck, 1811; and, *Mitra sanguinolenta* Lamarck, 1811. The shells of the aforementioned three species do not have much in common with the herein restricted group of species, which is unnamed as of yet. In a following paper I will address this group of related species with descriptions of a new genus and new species in this species complex.

ABBREVIATIONS

MZB	Museum Zoologicum Bogoriense, Cibinong, Bogor, Indonesia
ZSM	Zoologische Staatssammlung München, Munich, Germany
MH	Collection of Manfred Herrmann, Rosdorf, Germany
GS	Collection of Günter Stossier, Hamburg, Germany
ARN	Collection of Armen Rizal Ngo, Jakarta, Indonesia

SYSTEMATICS

Family: Mitridae Swainson, 1831
Subfamily: Mitrinae Swainson, 1831
Genus: Quasimitra Fedosov, Herrmann, Kantor & Bouchet, 2018

Quasimitra stossieri (Herrmann, 2016).
Proposed Synonym: *Quasimitra houarti* Dharma, 2021

Original description of *Q. stossieri*: "Shell solid, slender fusiform, medium sized, reaching 53.3 mm in length; width 30-36 % of length. Only fragments of white, glassy protoconch present. Teleoconch consists of 7 to 8 slightly convex whorls. Suture well defined but not deep. Straight outline of spire. All whorls smooth and completely covered with fine spiral grooves, dissected by minute axial threads. 8 to 9 spiral grooves on penultimate and 32 to 40 grooves on body whorl. Aperture equal in length to the spire, narrow and lanceolate. In adult specimen outer lip thickened, crenulated, and rounded with a more straight posterior part. Columella with 5 well-defined oblique folds of nearly equal strength. Callus layer moderately thin, but well defined. Siphonal canal slightly shorter than outer lip, almost straight with a small dorsal notch. Colour pattern, whitish to cream shell with 2 to 4 dark brown axial streaks on every whorl with darker area at the suture, not directly continued on next whorl, on body whorl ending one third before anterior end. At shell periphery large light blotches on the cream background between the streaks. On body whorl a few fine, nearly invisible white dots are existent which are nearly absent on penultimate or earlier whorls. Tips of crenulated lip dotted brown. Those fine brown dots are sometimes also present on axial lines on body and earlier whorls together with a slight axial groove, looking like a secondary lip. Aperture cream white."

Original description of *Q. houarti*: "Shell of average size for genus, height up to 58.5 mm, thick, elongate ovate, spire rather tall and tapering to apex, last whorl large. In all material examined the protoconchs were missing, adult shells averaging 9-10 whorls; spire whorls almost flat or somewhat convex, more convex towards the last whorl, and last whorl slightly inflated; suture shallow, crenulated by termination of radial ribs; base color white, with irregular light brown and brown streaks, and small scattered white spots; streaks reach suture; some earlier whorls whitish; body whorl with three light brown spiral bands, first above aperture posterior, the third vague near bottom above siphonal fasciole, and the second between those two bands; shell sculptured with 28-44 spiral grooves and intersecting with radial striae or microscopic radial ribs; aperture elongate, oblique, angulated posteriorly, slightly inflated at the bottom, height of aperture slightly longer than half of the shell height; inside of aperture smooth, white; outer lip thickened, glossy, terminating in brown denticles at end of spiral grooves; columella overlaid with white callus, with 5-6 oblique folds; umbilicus closed; siphonal canal slightly recurved, siphonal fasciole sculptured with oblique spiral cords, siphonal notch open."

Besides the difference in style of describing the aspects of the shells, the major differences are set out in Table 1. It seems the shells of *Q. houarti* are slightly longer and slimmer than those of *Q. stossieri*. The type localities of both holotypes are roughly 150 km apart, with the Island of Lombok in between. Paratype 1 and 5 of *Q. stossieri* show the same slenderness of the shells depicted by Dharma. As these differences are minor, they fall within the species variability.

	Q. stossieri	*Q. houarti*
Shell length	Reaching 53.3 mm	Height up to 58.5 mm
Form	Slender fusiform	Elongate ovate
Number of whorls	Teleoconch consists of 7 to 8 slightly convex whorls = 8-9 whorl in total	Adult shells averaging 9-10 whorls.
Sculpture on body whorl	32 to 40 grooves	28-44 spiral grooves
Columella	Columella with 5 well-defined oblique folds of nearly equal strength. Callus layer moderately thin, but well defined.	With 5-6 oblique folds. Columella overlaid with white callus.
Origin of holotype	Bali, Sanur	Bungin Island, northwest of Sumbawa Island, Nusa Tenggara Islands

Table 1. Noted differences in the descriptions of *Q. stossieri* and *Q. houarti.*

CONCLUSION

The conclusion is that *Q. houarti* is a junior synonym of *Q. stossieri*. Because *Q. houarti* has an entry in the WoRMS database as an accepted species, rather it was appropriate to recognize *Q. houarti* as in synonymy.

Describing new species is not an easy job, and one requires a knowledge of the species variability, range, and a thorough review of relevant literature. Being up to date with literature is critical with the many new species described every year. Relying on older books is a pitfall for species identification. Often popular books copy the faults from other (older) popular books and the errors continue. Unfortunately, Dharma (2021), a well-respected author, as well as the reviewer of his article must have overlooked the publication of Herrmann (2016).

ACKNOWLEDGEMENTS

Günter Stossier, Hamburg, Germany, is thanked for the photos of the paratypes of *Mitra stossieri* Herrmann, 2016 used for the plate. The holotype is under copyright of the Zoologische Staatssammlung München and therefore could not be used in this paper. Other specimens used in the plate are from Armen Ngo Collection, taken from the same population as holotype, which was used to describe *Q. houarti.*

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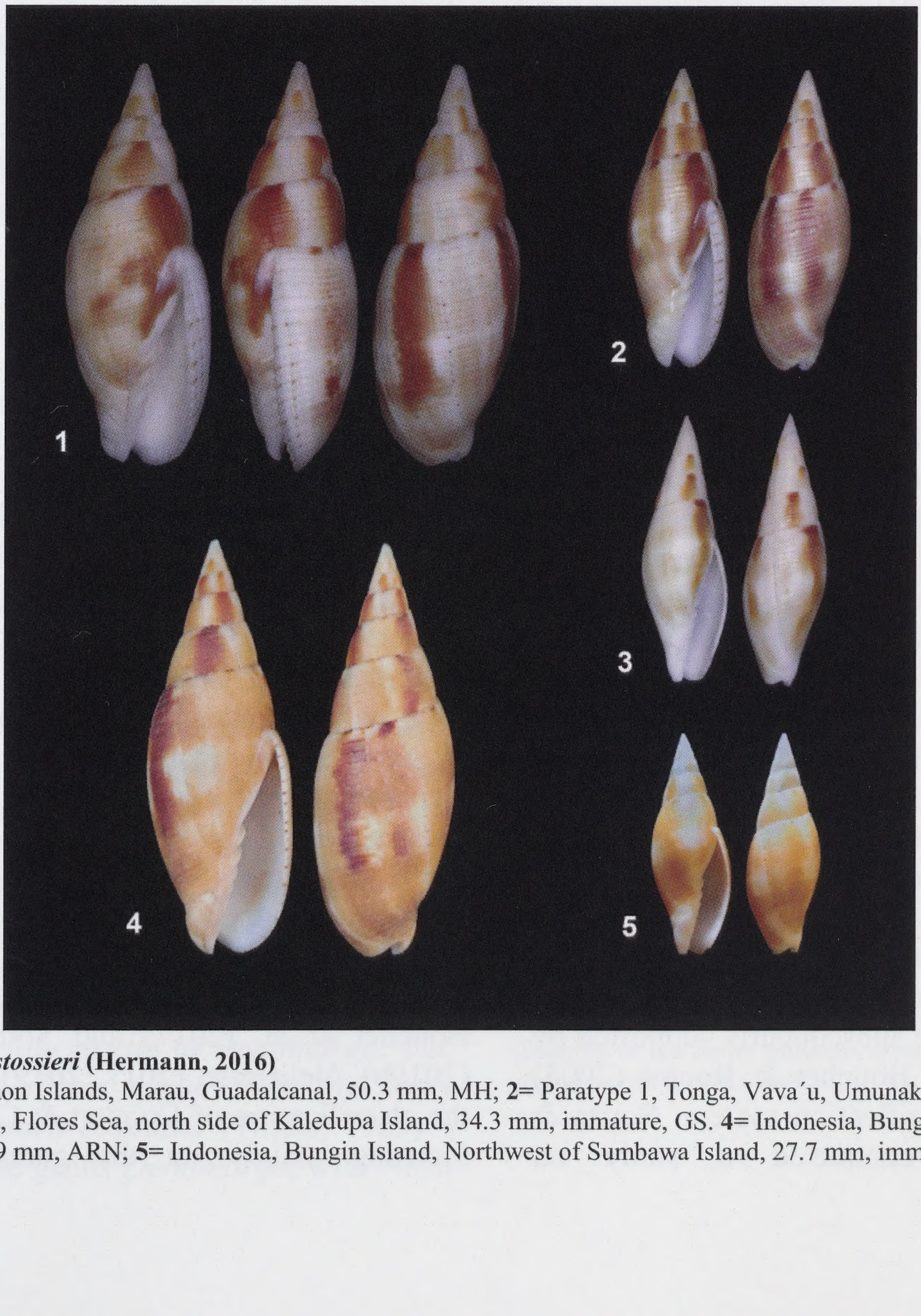

Plate 1. ***Quasimitra stossieri*** **(Hermann, 2016)**
1= Paratype 2, Solomon Islands, Marau, Guadalcanal, 50.3 mm, MH; **2=** Paratype 1, Tonga, Vava´u, Umunak, 37.6 mm, GS; **3=** Paratype 6, Indonesia, Flores Sea, north side of Kaledupa Island, 34.3 mm, immature, GS. **4=** Indonesia, Bungin Island, northwest of Sumbawa Island, 51.9 mm, ARN; **5=** Indonesia, Bungin Island, Northwest of Sumbawa Island, 27.7 mm, immature specimen, ARN.

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Introducing a new genus of Marginellidae from Africa: *Africosta* new genus (Gastropoda: Marginellidae) along with the description of two new species

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ABSTRACT A small group Marginellidae species were moved between genera several times by different authors, described as *Marginella,* sometimes called *Glabella,* classified under *Dentimargo,* and also reclassified as being *Eratoidea* species. This group of very small Marginellidae has their own unique shell characteristics within the family, and are described here within a new genus: *Africosta.* Four known species are discussed along with the description of two new species from KwaZulu-Natal, South Africa within the new genus.

KEYWORDS Marginellidae*, Africosta, Eratoidea, Dentimargo, Marginella, Glabella,* KwaZulu-Natal, South Africa, Africa

INTRODUCTION

The family Marginellidae is a very diverse group of marine gastropods and its taxonomy has been a subject of considerable debate by several authors for almost a century (Thiele 1929; Coan 1965; Vaught 1989; Coovert & Coovert 1995; Millard 1997). Thiele (1929) recognized only three genera, namely *Persicula*, *Marginella*, and *Marginellona*. Coan (1965) used Thiele's classification, but re-organized the species within the genera. Vaught (1989) grouped all the species in the subfamily Marginellinae under the genus *Marginella*, but suggested several subgenera. However, most of the subgenera proposed by Vaught (1989) were elevated in later works to genus level, and some were synonymized (Coovert & Coovert 1995; Millard 1997; Bouchet & Rocroi 2005). Coovert & Coovert (1995) undertook a comprehensive revision on the marginelliform gastropods, including the families Marginellidae and Cytiscidae, and were subsequently supported by Millard (1997) and Bouchet & Rocroi (2005) who used their classification system. Souza & Simone (2019b) conducted a study on phylogenetic relationships of some of the genera in the Marginellidae based on comparative morphology, strengthening the current classification of the family.

Coovert & Coovert (1995) undertook a phylogenetic reclassification on the family Marginellidae and divided it into two subfamilies, the Marginelloninae and the Marginellinae. The subfamily Marginelloninae comprises two genera, *Afrivoluta* and *Marginellona*. The subfamily Marginellinae is further divided into three tribes, the Austroginellini, the Prunini, and the Marginellini, and an extinct genus *Myobarum* (Coovert & Coovert 1995). These classifications involved the use of broad shell morphological and anatomical differences (Coovert & Coovert 1995). Souza & Simone (2019a) provided a checklist of the generic and supra-generic classification of Marginellidae following the classification of Coovert & Coovert (1995), Bouchet *et al.* (2017) and Souza & Simone (2019b). Veldsman (2017, 2019) also followed the classification of Coovert & Coovert (1995), focusing mainly on the genus *Marginella*.

Boyer (2019) proposed a new classification for the Marginelloninae by describing a new family Marginellonidae. A more recent trend is to classify the Marginellidae into three subfamilies rather than tribes, namely Marginellinae, Austroginellinae and Pruninae (Fedosov *et al.* 2019, MolluscaBase 2021a).

The focus of the current study includes only some of the extant genera within the subfamily Marginellinae (ex. Tribe Marginellini). Several morphological and anatomical differences between the known genera are discussed by Coovert & Coovert (1995) and Souza & Simone (2019b). The main shell morphological differences between the living genera are that while *Dentimargo* and *Eratoidea* lack a siphonal notch, this is present in *Marginella* and *Glabella*. *Eratoidea* has sub-equal labial denticulation and some of the species have axial costae, whereas *Dentimargo* is characterised by the bifurcated ends of the columellar plications joining a collabral callus ridge, and have a prominent posterior labial notch (Coovert and Coovert 1995). Species from the genus *Glabella* have prominent axial costae, whereas *Marginella* species have a smooth shell (Coovert & Coovert 1995). Three of the four extant known Marginellinae occur in African waters, and only Eratoidea represents a Caribbean genus (Coovert & Coovert 1995).

A small group of Marginellidae species are found along the eastern coast of Africa, the first of which was thought to be described by Thiele (1925). Lussi & Smith (2000) mentions a species by the name *Marginella costulata* Thiele (no date) hosted in the Natural History Museum in Berlin (two types ZMB: 102153) with Zanzibar as the Type locality, changing it from the genus *Marginella* to *Dentimargo*. The second mention of this species is in McCleery (2011) as *Eratoidea costulata* (Thiele, 1925) – changed from the genus *Dentimargo,* with Natal as the Type locality. After research into the published work of Thiele, it was established no reference to the description of this species could be found. This was confirmed by Bouchet (personal communication, 2021) and the following note was added to the entry in WoRMS (MolluscaBase eds. 2021b) "McCleery (2011:102) treated "*Eratoidea costulata*" as a valid species and attributed the name to Thiele, 1925. However, Thiele did not establish a species with that name, neither in *Marginella*, nor in *Dentimargo*, nor in any other marginellid genus. Because ICZN Art. 16.1 requires that "every new name published after 1999 [...] must be explicitly indicated as intentionally new", the name *Eratoidea costulata* cannot be attributed to McCleery, 2011, and remains unavailable." The Berlin Museum was contacted with regards to investigate this elusive species. The Berlin Museum hosts a species by the name "*Marginella costulata*" labeled by Thiele, from Zanzibar, marked with a star (Figure 1). According to Zorn (personal communication, 2021) the star means that Thiele marked it as a Type specimen.

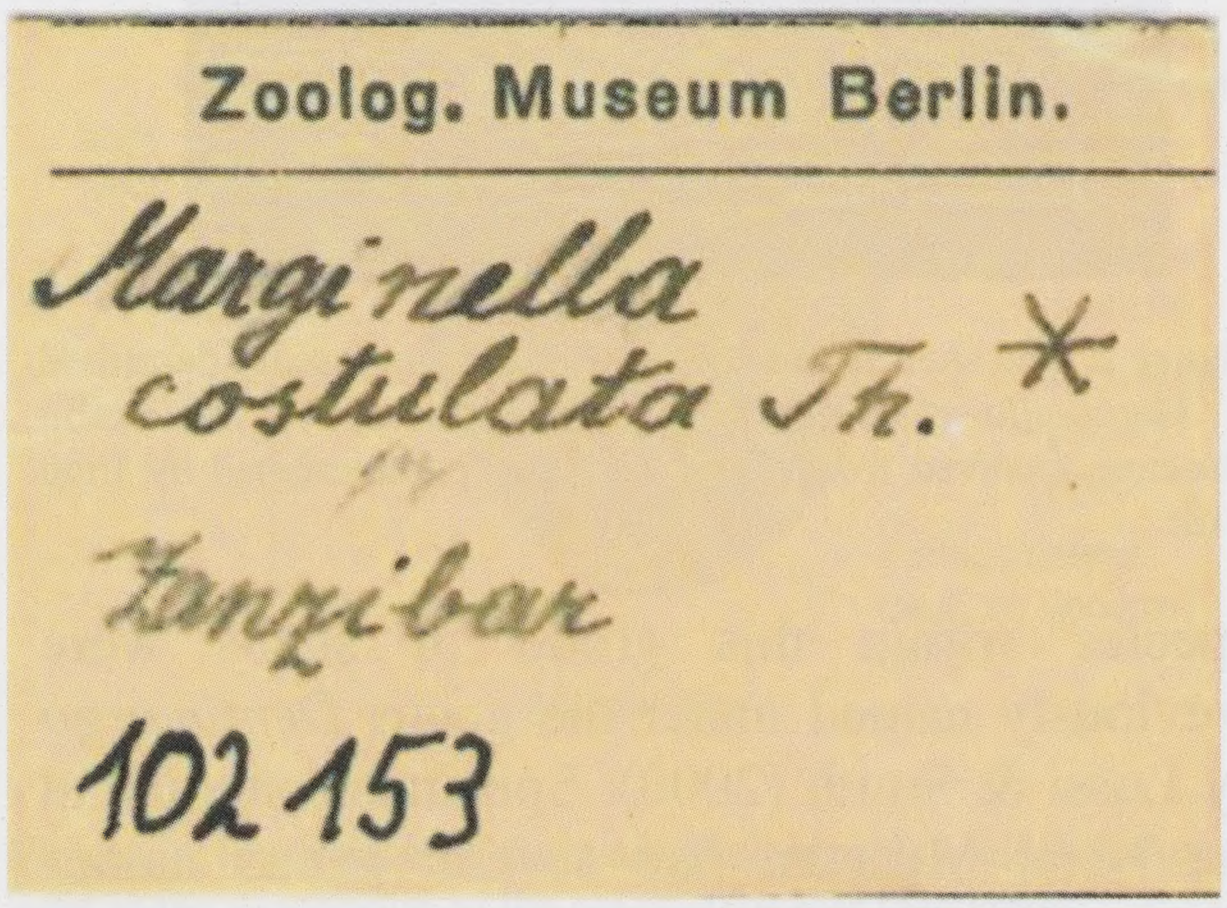
Zoolog. Museum Berlin.
Marginella
costulata Th. *
Zanzibar
102153

Figure 1. The original label of the shell in the Berlin Museum supposedly described as *Marginella costulata* by Thiele. Courtesy of the Berlin Museum, received from Christine Zorn, photographed by Eran Wolf.

A photograph was received from the Berlin Museum (Figure 2) of the species supposedly named by Thiele. This shell resembles the species "*costata*" described by Bozzetti in 1997 from Zanzibar. Still no written/published reference could be found to where this species is supposed to be described, and until the specific reference is found, it can't be accepted as a valid species.

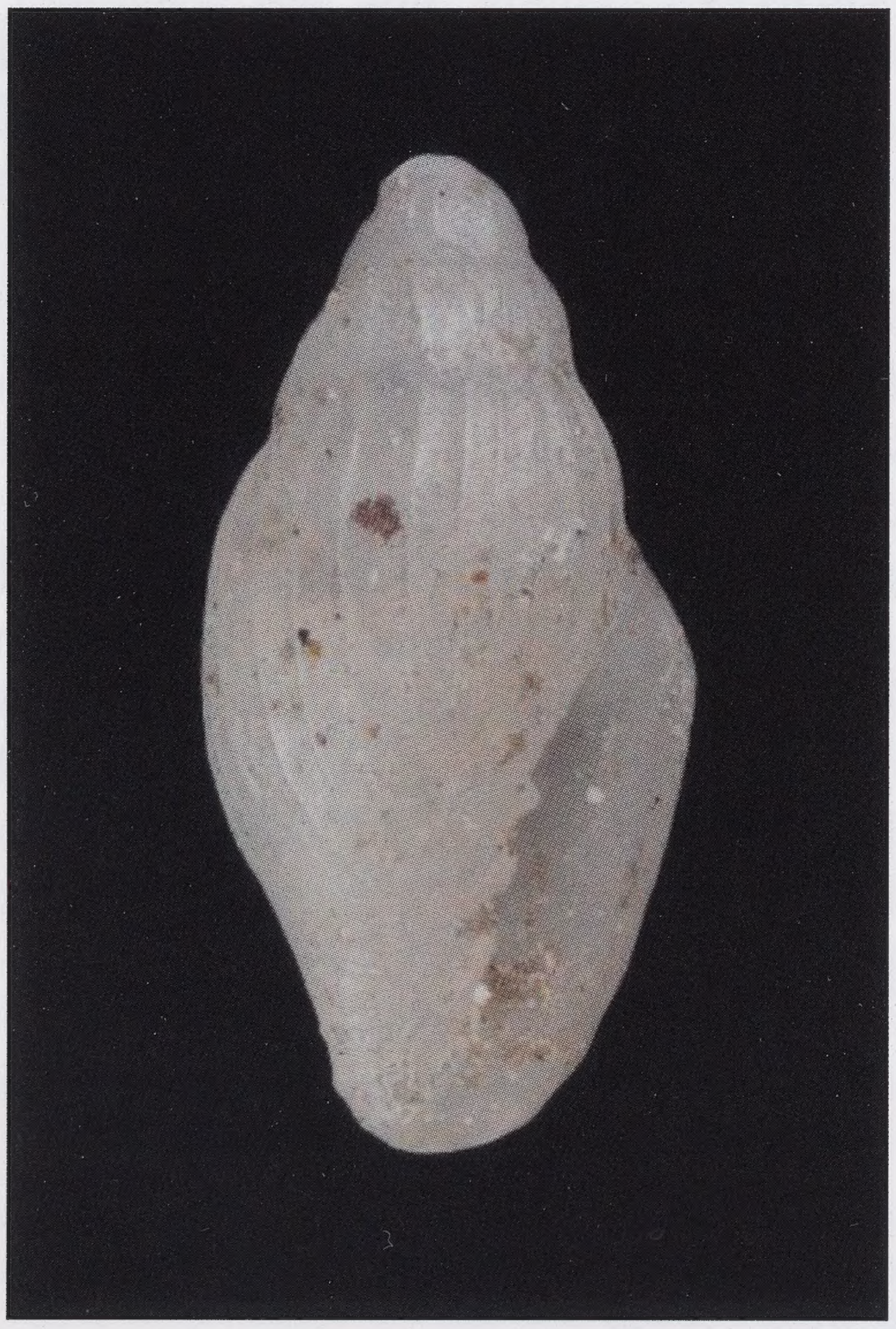

Figure 2. The shell in the Berlin Museum supposedly described as *Marginella costulata* by Thiele. Courtesy of the Berlin Museum, received from Christine Zorn, photographed by Eran Wolf.

Species within this group of shells were previously named under the genus *Dentimargo* by Lussi & Smith (2000). Specimens studied at the Natal Museum had several genus names allocated on their labels, such as: *Marginella sp., Marginella (Glabella) sp.,* and *Marginella (Plicaginella) sp. Plicaginella* is now synonymized with *Austroginella,* a genus of species in the subfamily Austroginellinae. McCleery (2011) reclassified the species under the genus *Eratoidea* as the '*Eratoidea costulata* species group'. McCleery's reasoning being the species have costate shell surfaces and four strong plications, which in some species are bifurcated. McCleery (2011) further note an important point that these species differ significantly from the Caribbean *Eratoidea* in several respects, the most noticeable being the lip, which is wide, straight and without labial denticles, and wide conspicuous ventral callus in some species. The author agrees with McCleery (2011) that these species are different and do not fit into any other species group or genus because of its distinct features. Since these species also do not really compare to *Eratoidea, a* new genus name to include them are proposed here: *Africosta* new genus and the main shell morphological differences between the genera discussed here are tabled below.

METHODS

Main shell morphological features were used during this study to differentiate the species from the newly proposed genus with other genera in the Subfamily Marginellinae. There are no published records or data of the animal material, as reiterated by McCleery (2011), thus no comparison regarding the anatomy is made.

Holotype material of most of the species are hosted in the National Museum of History (MNHN), Paris, France, and images were obtained from the MNHN website. Shells hosted in the Natal Museum, Pietermaritzburg, South Africa were studied and photographed using an Olympus SZ61 microscope (SC100 Olympus camera, Münster, Germany) and digitally measured (Stream Imaging Software, Olympus) by the author (2015).

Several shell morphological features are used here to differentiate species from each other, but not limited to, the shoulder shape and width, general shape of the shell, spire height and characteristics, aperture shape and width, shape of the labrum, costae shape and separation on body whorl. Further to the shell morphological features, location is very important as noted.

SYSTEMATICS

Phylum Mollusca Linnaeus,1758
Class Gastropoda Cuvier, 1795
Subclass Caenogastropoda Cox 1960
Order Neogastropoda Wenz, 1938
Superfamily Volutoidea Rafinesque, 1815
Family Marginellidae Fleming, 1828
Subfamily Marginellinae Fleming, 1828

Africosta S.G.Veldsman, new genus

Type species: *Africosta delphinica* (Bavay, 1920), designated here.

Congeners:
Africosta aliwalobliqua n. sp.
Africosta costata (Bozzetti, 1997)
Africosta gigacostata (Bozzetti, 2016)
Africosta nataliaglobosa n. sp.
Africosta sinuosa (Bozzetti, 1997)

Shell characters. Shells are very small (2-4 mm), biconical shaped, has a low angled rounded shoulder. The surface of the body whorl is costate (Figure 3). Has a thick labrum, smooth with and axial ridges or ridges present on the edge of the lip and on the varix. No labial denticles present, but a large flat labial notch is present on the posterior side of the lip. Prominent posterior canal visible. Callus is highly developed on the columella. Spire moderately high to high, spire whorls convex and stepped with suture present. Wide protoconch, off-white to light grey color. Columella rather straight with four thick continuous plications, which take up more than half the length of the aperture, off-white color. Aperture narrow and relatively straight, mainly off-white color. Siphonal canal is slightly flaring, with no siphonal notch present. The number of whorls varies between the species from around 3.5 to 6. The background color of most of the species are off-white.

McCleery (2011) makes special mention of the strong surface texture around the aperture, and the callus that extends in an arc from the first plication to the labial insertion point, strongest anteriorly, weakening posteriorly.

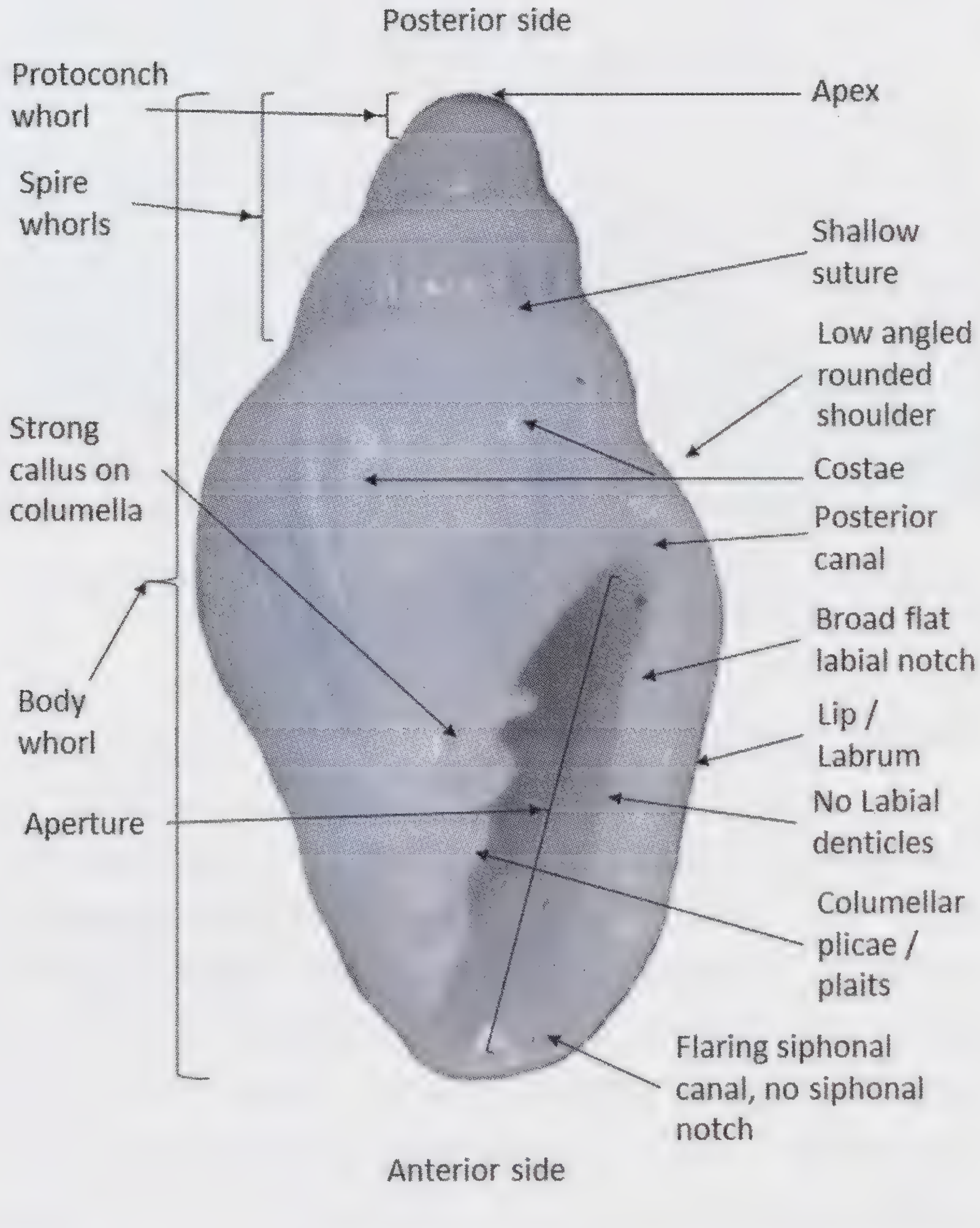

Figure 3. Illustration of the main shell morphological features used in the description of the genus *Africosta* new genus.

Distribution. The species within this genus occur from South Africa, Madagascar, Zanzibar and Oman (Figure 4).

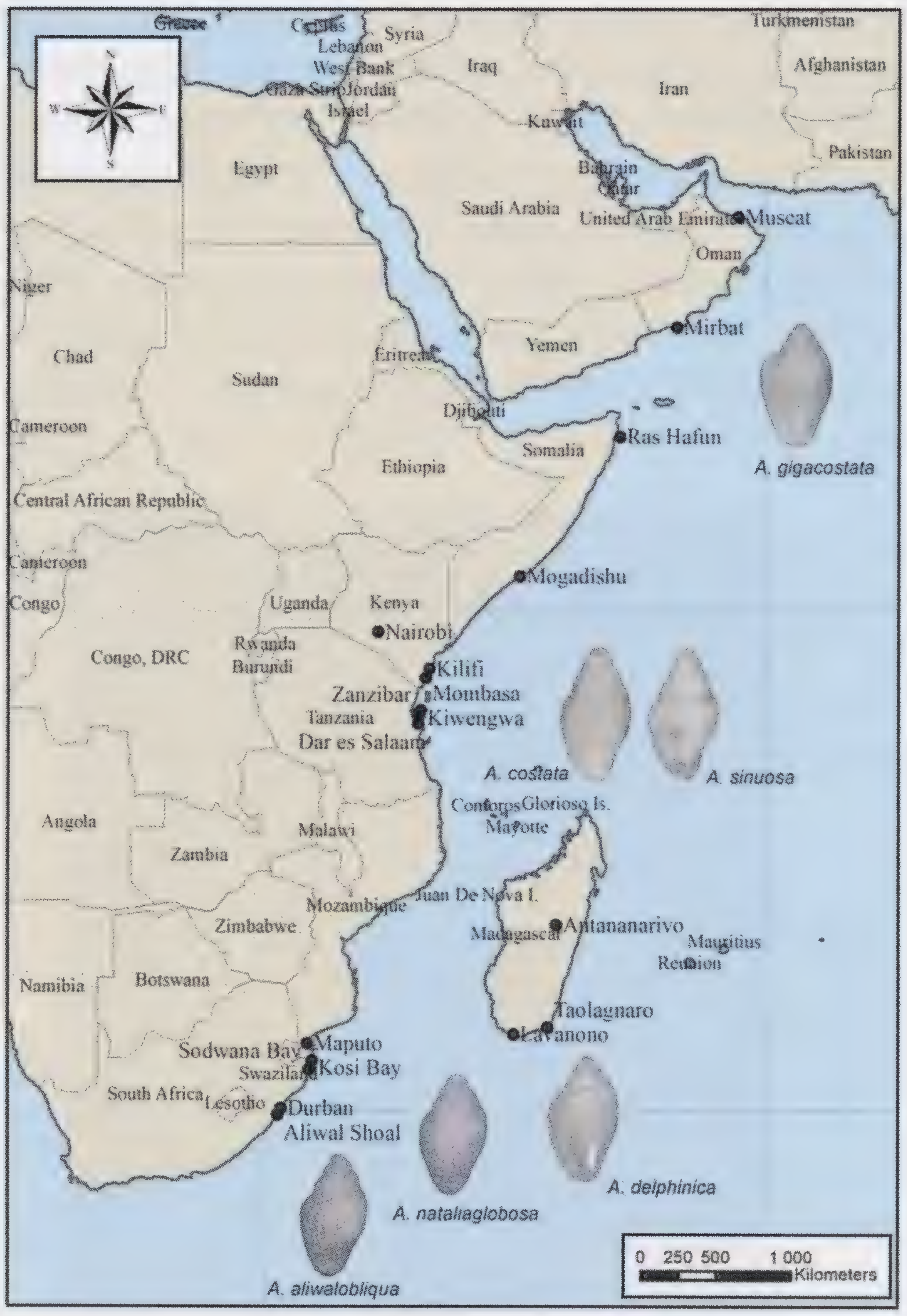

Figure 4. Locality map indicating the region where the five new species occur, Eastern Cape, South Africa.

Genus discussion.

The genera under the subfamily Marginellinae used in this comparison are *Marginella, Glabella, Dentimargo, Eratoidea,* and the newly described genus *Africosta*. Apart from the author's own observations, the following references are extensively used for the comparison, Coovert & Coovert (1995), Lussi & Smith (2000), McCleery (2011), and Souza & Simone (2019b). The main shell morphological features used to differentiate between the genera are (Table 1): costae present on body whorl, presence of a siphonal notch, labial denticulation, posterior canal, callus on columella and labial notch. For detailed discussions on the known genera, refer to the references above.

As mentioned before, the genus *Eratoidea* only occurs in the West Atlantic around the Caribbean, including the south-eastern USA, south of Georgia and the Bahamas in the north, and Trinidad & Tobago in the south east, ranging further towards to Brazil (McCleery 2011). *Dentimargo* species are found throughout most of the ocean, *e.g.* Australia, Indo-Pacific, Eastern Pacific, West Atlantic, West Africa and South Africa. *Marginella* and *Glabella* are found only around the African coast (West Africa, South Africa, East Africa and Madagascar). Previously several species from the West Atlantic were classified under the genus *Marginella,* but were re-assigned to the genus *Eratoidea* by Veldsman (2017, 2019). *Africosta* species are only known from the eastern Indo-Pacific that includes countries such as South Africa, Madagascar, Zanzibar, and Oman.

McCleery (2011) classified *Dentimargo boyeri* Bozzetti, 1994 under the genus *Eratoidea costulata* species group. However, *D. boyeri* has different shell morphological features and does not compare to *Eratoidea* species (apart form that it occurs off the Somalian coast and not in the Caribbean). Some *Dentimargo* species have costae present on the body whorl, or knobs on the shoulder and spire such as *D. boyeri* and *D. scapulatus* Boyer, 2017. These species display mostly *Dentimargo* shell morphological characteristics, thus cannot be placed within the new genus only because it has costae present. It is evident that the genus *Dentimargo* must be studied further to group species or reclassify them into subgenera since there is so much variation visible in particular features.

Genus	Costae	Callus on columella	Posterior canal	Siphonal notch	Labial denticles	Labial notch
Marginella	Smooth, no costae visible	Callus on columella varies between subgenera	No posterior canal visible	Siphonal notch present	Labial denticles present in some species, and lack in others	Labial notch present in some species and lack in others
Glabella	Have prominent axial costae present	Callus development varies between species	Posterior canal mostly visible	Siphonal notch present	Prominent labial denticles present	Labial notch present in some species and lack in others
Dentimargo	Smooth, costae visible only in a few species	Callus slightly developed, but varies between species	No posterior canal visible	Lack a siphonal notch	Labial denticles present in some species, and lack in others	Single sharp labial denticle present (larger than the rest of the labial denticles), but not always that prominently visible
Eratoidea	Some species have costae and others are smooth	Callus slightly developed, but varies between species	Posterior canal slightly developed in some species and not visible in others	Lack a siphonal notch	Prominent labial denticles present	Labial notch generally absent, with poster labial denticles sometimes larger than the rest
Africosta	Axial costae present	Callus highly developed over the largest part of the columella	Posterior canal visible	Slightly flaring siphonal canal, with no siphonal notch present	No labial denticles present	Large flat labial notch present

Table 1. Presentation of the main shell morphological differences between the five genera discussed.

SPECIES ACCOUNTS

Africosta costata (Bozzetti, 1997)

Africosta costata is a relatively small species (2-3 mm), broadly biconic in shape (Figure 5). The body whorl is strongly costate, with costae low and rounded from the shoulder and ending at the anterior side, slightly wavy on posterior side, widely spaced. Aperture straight and narrow. Background color is off-white, with no markings. Detailed shell descriptions can be obtained from Bozzetti (1997) and McCleery (2011). The type locality is Kiwengwa, Zanzibar.

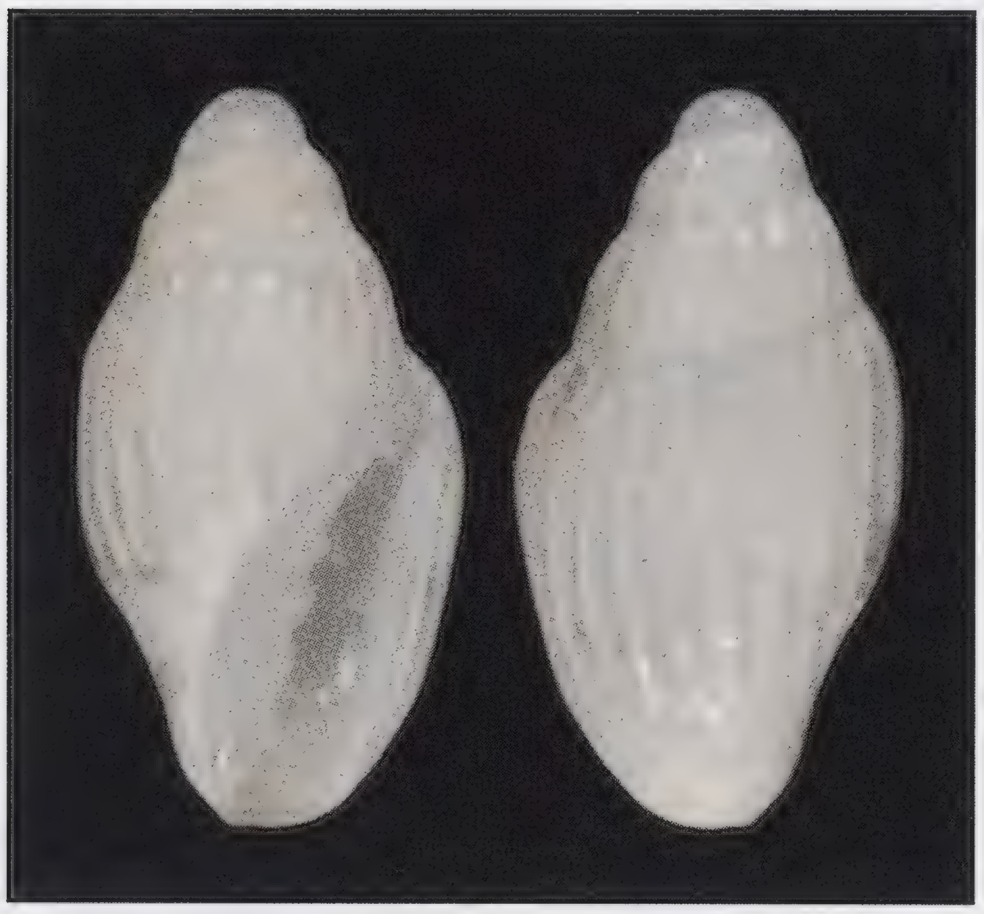

Figure 5. *Africosta costata* (Bozzetti, 1997), Holotype, 2.35 x 1.10 mm. Courtesy of the Muséum national d'Histoire naturelle, Paris (France), Collection: Molluscs (IM), Specimen MNHN-IM-2000-583.

Africosta delphinica (Bavay, 1920)

Africosta costata is a relatively small species (2-3 mm), broadly oval-biconic in shape (Figure 6). The body whorl has strong costae over the posterior side, widely spaced, smoothing out towards the anterior side. Aperture straight and narrow. Background color is off-white, with no markings (almost translucent). The type locality is "Madagascar in arenis" (Bavay 1920). This species was named for Fort Dauphin (now Taolagnaro) in southern Madagascar, so it can be assumed that the species occur there. Further there is a record of specimens trawled off Lavanono, southern Madagascar.

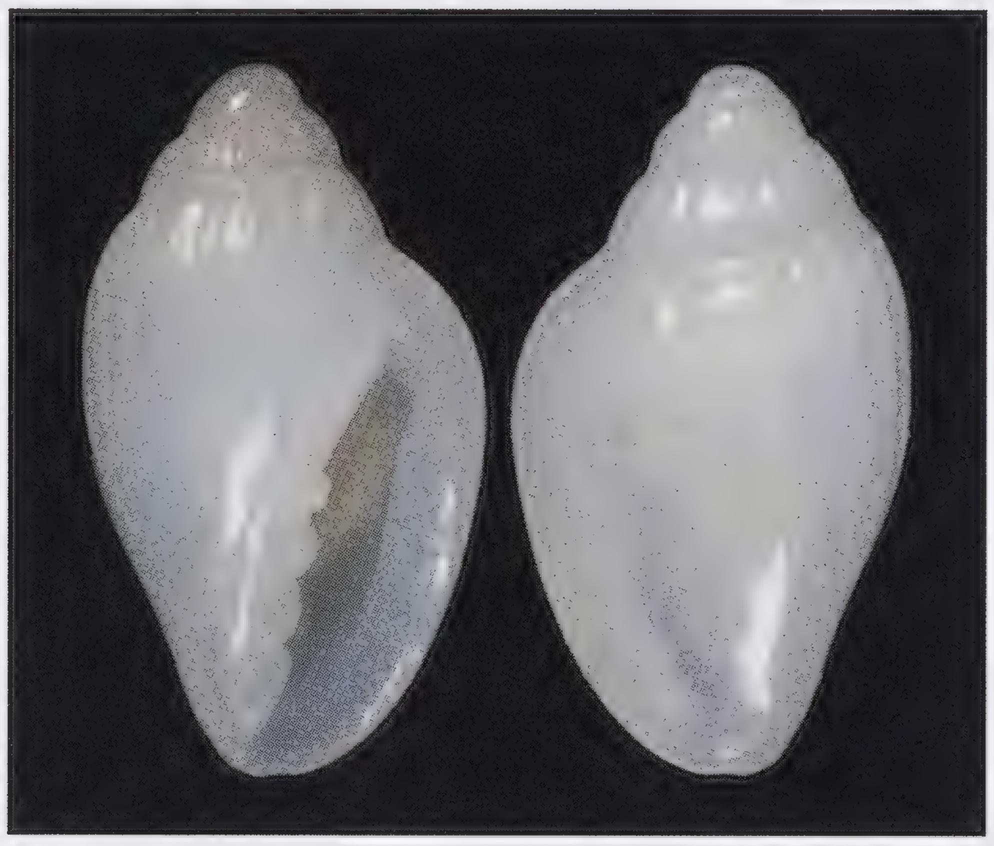

Figure 6. *Africosta delphinica* (Bavay, 1920), Holotype, 2.35 x 1.10 mm. Courtesy of the Muséum national d'Histoire naturelle, Paris (France), Collection: Molluscs (IM), Specimen MNHN-IM-2000-583.

Africosta gigacostata (Bozzetti, 2016)

Africosta gigacostata is a relatively small species (3-4 mm), broadly biconic in shape (Figure 7). Has a very distinct curved, sharp pointed shoulder. The body whorl has strong axial costae, costae narrow, low and rounded. Aperture straight and narrow. Background color is pearly-white, with no markings. The type locality is Mirbat, Oman Meridionale (Bozzetti 2016).

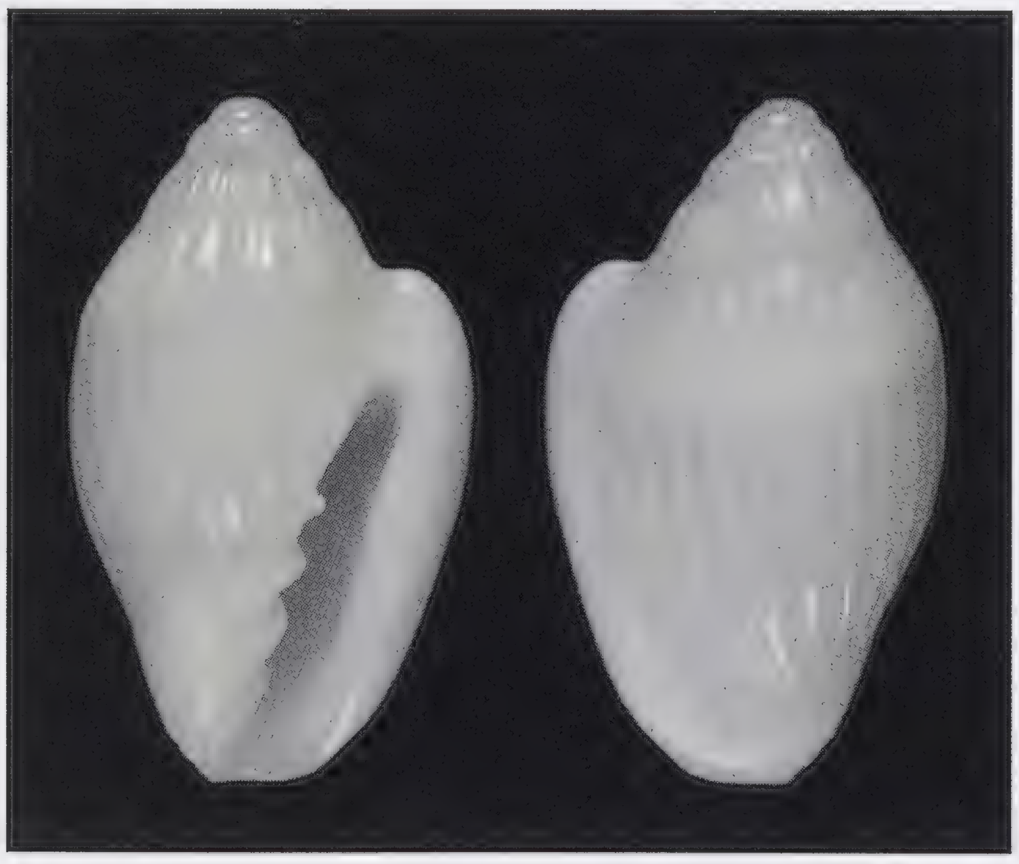

Figure 7. *Africosta gigacostata* (Bozzetti, 2016), Holotype, 3.9 x 2.2 mm. Courtesy of the Muséum national d'Histoire naturelle, Paris (France), Collection: Molluscs (IM), Specimen MNHN-IM-2000-28455.

Africosta sinuosa (Bozzetti, 1997)

Africosta sinuosa is a relatively small species (2-3 mm), broadly biconic, sinuous shaped (Figure 8). The body whorl is strongly costate, with costae low and rounded, spaced. Aperture straight and narrow. Costae smoothing slightly out towards the last quarter on the anterior end. Background color is off-white, slightly translucent, with no markings. Detailed shell descriptions can be obtained from Bozzetti (1997) and McCleery (2011). The type locality is Kiwengwa, Zanzibar.

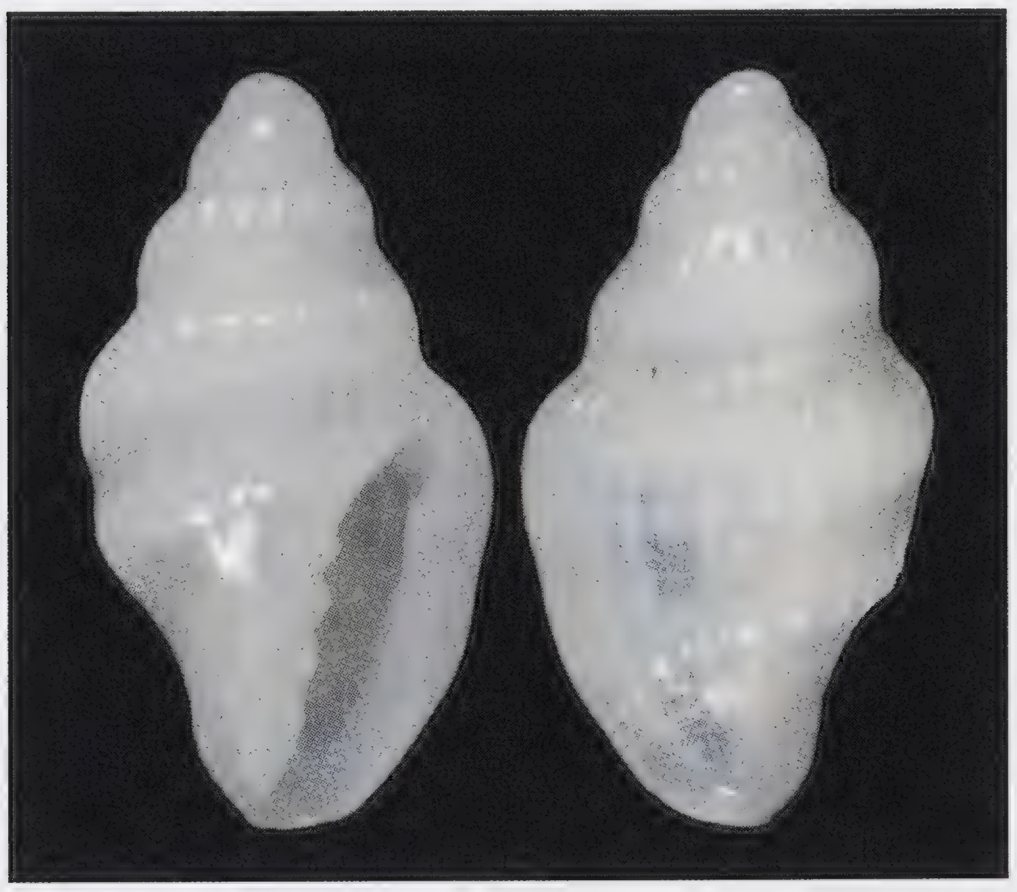

Figure 8. *Africosta sinuosa* (Bozzetti, 1997), Holotype, 2.35 x 1.15 mm. Courtesy of the Muséum national d'Histoire naturelle, Paris (France), Collection: Molluscs (IM), Specimen MNHN-IM-2000-1268.

Africosta nataliaglobosa S.G.Veldsman, new species

Description. The shell is small (2-3 mm), ovate-biconical shaped, has a low angled rounded shoulder (Figure 9). Thick broad labrum, smooth. Spire low and broad, spire whorls convex and slightly stepped. Wide protoconch, off-white color. No labial denticles present, but a large flat labial notch is present on the posterior side of the lip. Posterior canal present. Columella rather straight with four thick continuous plications, which take up more than half the length of the aperture, off-white color. Callus highly developed on the columella. Aperture narrow and straight, off-white color. Siphonal canal is slightly flaring, with no siphonal notch present. The body whorl is strongly costate, with costae moderately wide and rounded, narrowly spaced. Costae smoothing slightly out towards the last quarter on the anterior end. Background color of dorsum of the body whorl off-white.

Distribution. The type locality of *A. nataliaglobosa*, new species, is 2-Mile Reef, Sodwana Bay, Northern KwaZulu-Natal, South Africa, sorted from stone washings collected by divers at 10-15 m. Most specimens studied were collected by diver at shallow depths (8-22 m), and others were dredged at 50 m. The species distribution is from Sodwana Bay to Kosi Bay, Northern KwaZulu-Natal.

Type material.

Holotype: 2.55 x 1.39 mm (Figure 9.1); 2-Mile Reef, Sodwana Bay, sorted from stone washings, collected by diver at 10-15m, 1987; Coll. Natal Museum South Africa (NMSA), ID No: E737/T4500.

Other material examined:

NMSA - P1673/T4501 (one specimen); 2-Mile Reef, Sodwana Bay, sorted from stone washings, collected by diver at 10-15 m, 1987.

NMSA - S4248/T4502 (one specimen) 2.61 x 1.44 mm; Kosi Bay, main reef, 1-4 km south of estuary mouth, collected by diver at approx. 18 m by underwater pump, 1990.

NMSA - E5489/T4504 (one specimen) 2.5 x 1.51 mm; off Boteler Point (approx. 12 km south of Kosi Bay), dredged 50 m in dead coral rubble, 1987.

NMSA - S2034/T4505 (two specimens) 2.54-2.72 mm; Kosi Bay, main reef, 1-4 km south of estuary mouth, collected by diver at approx. 18 m by underwater pump, 1990.

NMSA - S3038/T4506 (4 specimens) 2.41-2.62 mm; between Bhanga Neck and Kosi Bay, reef off marker 13 north, collected by diver at 13 m, in hand dredged sand, 1990.

NMSA - S4347/T4503 (four specimens) 2.29-2.47 mm; 2-Mile Reef, Sodwana Bay, collected by diver at 10-15 m, hand dredged sand, 1990.

NMSA - S2470/T4508 (12 specimens) 2.49-2.95 mm; between Bhanga Neck and Kosi Bay, reef off marker 13 north, near pinnacles, collected by diver at 10-12 m, in hand dredged sand, 1990.

NMSA - S2702/T4507 (31 specimens) 2.24-2.83 mm; between Bhanga Neck and Kosi Bay, reef off marker 13 north, collected by diver at 5-9 m on algal portion, by underwater pump, 1990.

NMSA - S2861/T4509 (15 specimens) 2.70-2.71 mm (Figure 3.2); between Bhanga Neck and Kosi Bay, reef off marker 13 north, collected by diver at 8 m, by underwater pump, 1990.

NMSA: D9924/T4510 (six specimens) 2.40-2.56 mm; Kosi Bay, main reef, 1-2 km south of estuary mouth, collected by diver at 9-17 m, sorted from stone washings, 1987.

Etymology. *Africosta nataliaglobosa* is a combination name, "natalia" for KwaZulu-Natal and "globosa" for its rounded globe shape.

Africosta aliwalobliqua S.G.Veldsman, new species

Description. The shell is small (2.5-3.2 mm), biconic, slightly sinuous, oblique shaped, has a very low angled rounded shoulder (Figure 10). Thick broad labrum, smooth. Spire moderately high and broad, spire whorls convex and slightly stepped. Wide protoconch, off-white color. No labial denticles present, but a large flat labial notch is present on the posterior side of the lip. Posterior canal present. Columella rather straight with four thick continuous plications, which take up more than half the length of the aperture, off-white color. Callus highly developed on the columella. Aperture narrow and straight, off-white color. Siphonal canal is slightly flaring, with no siphonal notch present. The body whorl is strongly costate, with costae wide and rounded, widely spaced. Costae smoothing slightly out towards the last quarter on the anterior end. Background color of dorsum of the body whorl off-white.

Distribution. Type locality of *A. aliwalobliqua*, new species, is Landers Reef, Aliwal Shoal, KwaZulu-Natal, South Africa, collected by diver at 20-30 m, sorted from shell grit. All the specimens studied were collected in this manner (from 9-30 m), on the Aliwal Shoal (off Umkomaas, Park Rynie and Scottburgh), southern KwaZulu-Natal, and Durban, central KwaZulu-Natal.

Type material.

Holotype: 3.08 x 1.67 mm (Figure 10.1); Landers Reef, Aliwal Shoal, KwaZulu-Natal, South Africa, sorted from shell grit, collected by diver at 20-30 m, 1988; Coll. Natal Museum South Africa (NMSA), ID No: E2303/T4511.

Other material examined:

Veldsman Collection (five specimens) 2.97-3.21 mm; Addington Beach, Durban Bay, collected by dredging, 1992.

NMSA - S7187/T4513 (one specimen) 3.12 x 1.59 mm; Aliwal Shoal, off Scottburgh, collected by diver at 25-27 m, in hand dredged sand and reef debris, 1992.

NMSA - E1683/T4512 (two specimens) 2.60-2.65 mm; Aliwal Shoal, off Umkomaas, collected by diver at 27 m, in silt from between rocks, 1988.

NMSA: S5955/T4514 (14 specimens) 2.73-3.14 mm; Aliwal Shoal, collected by diver at 16 m, in hand dredged sand, 1990.

NMSA: S8622/T4515 (38 specimens) 2.5-2.99 mm; Aliwal Shoal, off Scottburgh, collected by diver at 14 m, by underwater pump, 1991.

NMSA: E6122/T4516 (one specimen) 2.56 x 1.33 mm (Juvenile); Aliwal Shoal, collected by diver at 9-15 m, 1988; Coll.

Etymology. *Africosta aliwalobliqua* is a combination name, "aliwal" for Aliwal Shoal and "obliqua" for its almost oblique shape.

DISCUSSION

The two newly described species are compared to the two closest relatives from further north (Zanzibar/Kenya). *Africosta sinuosa* (Bozzettii, 1997) stands out with its sinuous general shell shape, very different from the other species. *Africosta costata* (Bozzetti, 1997) has a slender shell shape in comparison to the two new species. The body whorl of *A. costata* is much more rounded without any prominent indents such as the prominent indents of *A. sinuosa* (causing the sinuous shape); the slight indents of *A. aliwalobliqua* (creating the oblique shell shape), and the sharp lower indent of *A. nataliaglobosa* (giving the very rounded globose shell shape). Further, the costae of *A. costata* seem to extend lower down towards the anterior side than with the two new species where the costae smooth out on the lower third of the body whorl on the anterior side. *Africosta delphinica* (a very oval shaped shell) from Madagascar, has an even smoother body whorl, with costae mainly present on the upper half (posterior side) of the body whorl. The costae of *A. aliwalobliqua* is slightly broader and more widely spaced than the thinner costae of *A. nataliaglobosa* that is narrowly spaced. The lip of *A. nataliaglobosa* is much more rounded than *A. aliwalobliqua* that is slightly bent, but not as straight as the lip of *A. costata*. *Africostae gigacostata* is different from all the other species, having a very distinct sharp shoulder with the most prominent posterior canal, its costae cover most of the body whorl from the posterior side to the anterior end, and has a very straight lip.

McCleery (2011) illustrated two specimens from KwaZulu-Natal thought at that stage to be "*costulata* Thiele", the only specimens he studied. Clear differences can be observed between the two specimens illustrated. Figures 439, 444, 446, 447, 448, and 452 (McCleery 2011) illustrate a specimen that compares to new species *A. aliwalobliqua*, and Figures 440, 445, 449, 450, 451, and 452 (McCleery 2011) illustrate a specimen comparing to the other new species *A. nataliaglobosa.* McCleery (2011) only discuss some differences between the KwaZulu-Natal specimens and the species (*A. costata*) from Zanzibar, but without any differences between the two specimens illustrated.

The species within this genus is widely geographically separated from each other:

- *Africosta gigacostata* (Bozzetti, 2016) – southern Oman
- *Africosta costata* (Bozzetti, 1997) - Kiwengwa, Zanzibar and Kenya
- *Africosta sinuosa* (Bozzetti, 1997) - Kiwengwa, Zanzibar
- *Africosta delphinica* (Bavay, 1920) - southern Madagascar
- *Africosta nataliaglobosa* n. sp. – northern KwaZulu-Natal, South Africa
- *Africosta aliwalobliqua* n. sp. - southern KwaZulu-Natal, South Africa

From the material studied by the author, it currently seems that *A. nataliaglobosa* occur mainly in northern KwaZulu-Natal, whereas *A. aliwalobliqua* occur further south, from Durban to Park Rynie, southern KwaZulu-Natal. McCleery's (2011) two specimens apparently came from Park Rynie, which indicates that *A. nataliaglobosa* occur further south towards Park Rynie, this however has to be confirmed by further collection data.

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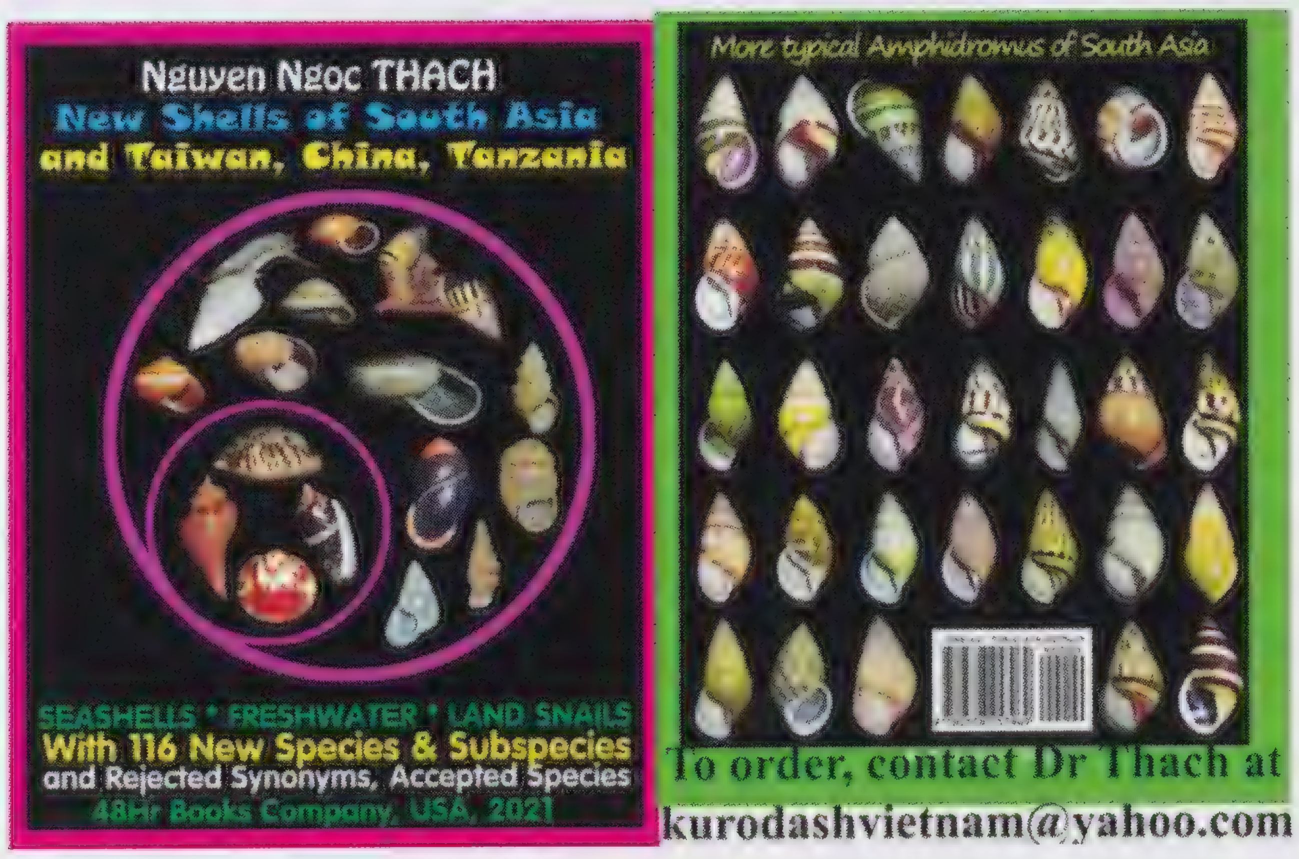

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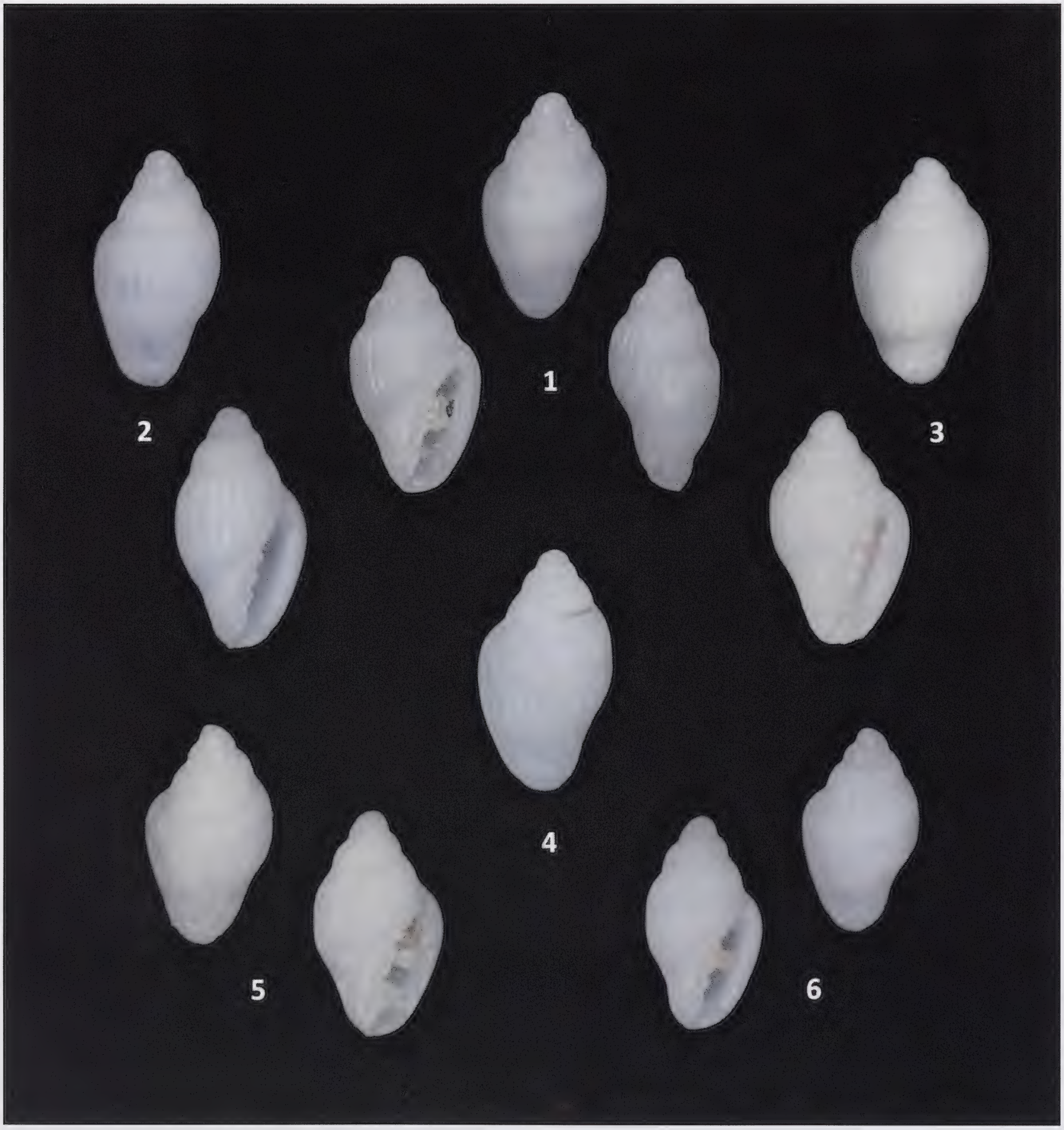

Figure 9. ***Africosta nataliaglobosa***

1= Holotype: 2.55 x 1.39 mm; 2-Mile Reef, Sodwana Bay, sorted from stone washings, collected by diver at 10-15 m, 1987; NMSA - E737/T4500; **2**= 2.61 x 1.44 mm; Kosi Bay, main reef, 1-4 km south of estuary mouth, collected by diver at approx. 18 m by underwater pump, 1990; NMSA - S4248/T4502; **3**= 2.50 x 1.51 mm; off Boteler Point (approx. 12 km south of Kosi Bay), dredged 50 m in dead coral rubble, 1987; NMSA - E5489/T4504; **4**= 2.59 x 1.44 mm; between Bhanga Neck and Kosi Bay, reef off marker 13 north, near pinnacles, collected by diver at 10-12 m, in hand dredged sand, 1990; NMSA - S2470/T4508; **5**= 2.43 x 1.41 mm; 2-Mile Reef, Sodwana Bay, collected by diver at 10-15 m, hand dredged sand, 1990; NMSA - S4347/T4503; **6**= 2.29 x 1.27 mm; 2-Mile Reef, Sodwana Bay, collected by diver at 10-15 m, hand dredged sand, 1990; NMSA - S4347/T4503.

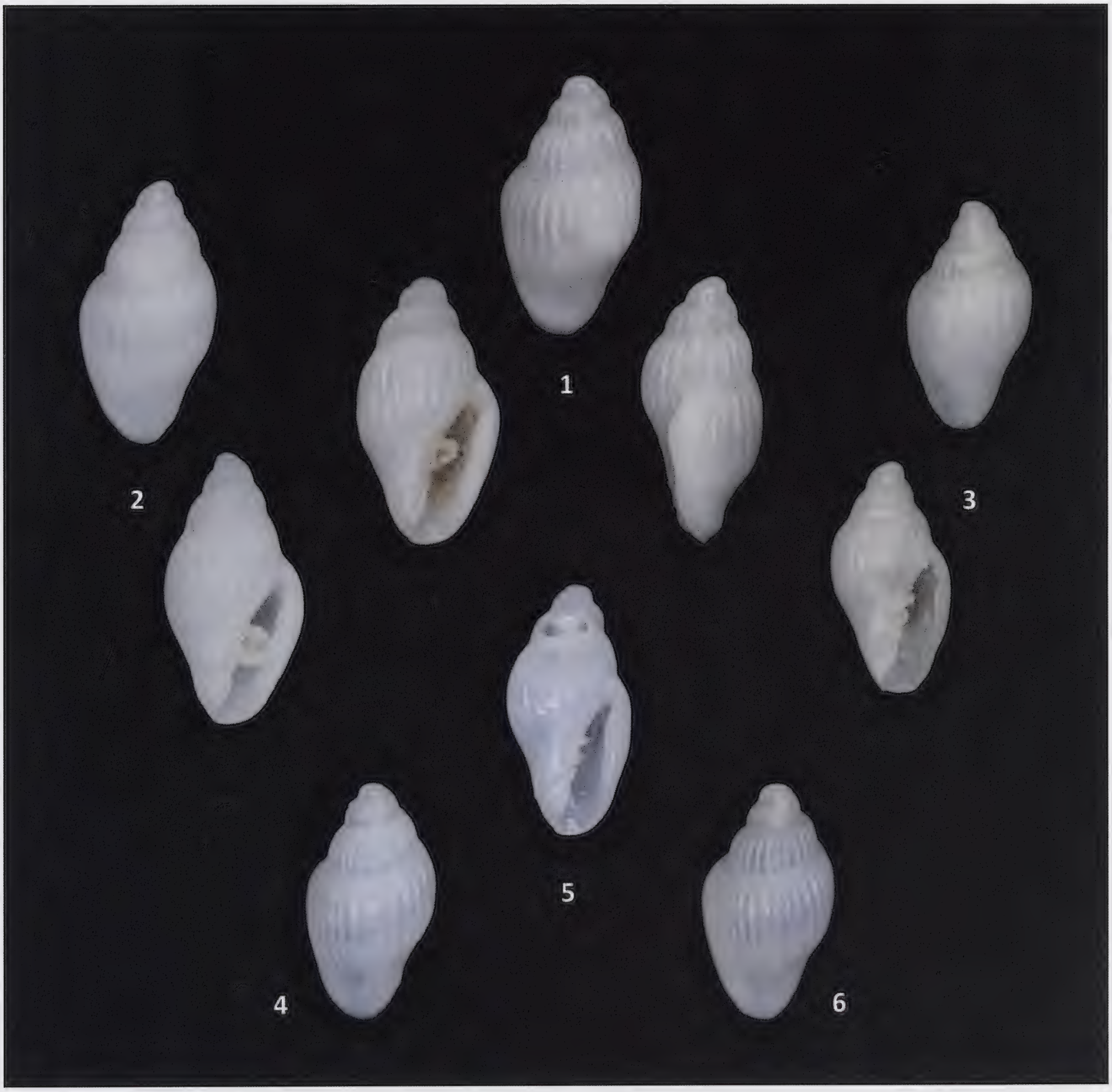

Figure 10. ***Africosta aliwalobliqua***
1= Holotype: 3.08 x 1.67 mm; Landers Reef, Aliwal Shoal, KwaZulu-Natal, South Africa, sorted from shell grit, collected by diver at 20-30 m, 1988; NMSA - E2303/T4511; **2**= 3.12 x 1.59 mm; Aliwal Shoal, off Scottburgh, collected by diver at 25-27 m, in hand dredged sand and reef debris, 1992; NMSA - S7187/T4513; **3**= 2.65 x 1.41 mm; Aliwal Shoal, off Umkomaas, collected by diver at 27 m, in silt from between rocks, 1988; NMSA - E1683/T4512; **4**= 2.70 x 1.48 mm; Aliwal Shoal, off Scottburgh, collected by diver at 14 m, by underwater pump, 1991; NMSA: S8622/T4515; **5**= 2.87 x 1.48 mm; Aliwal Shoal, off Scottburgh, collected by diver at 14 m, by underwater pump, 1991; NMSA: S8622/T4515; **6**= 2.99 x 1.51 mm; Aliwal Shoal, off Scottburgh, collected by diver at 14 m, by underwater pump, 1991; NMSA: S8622/T4515.

A new endemic species of *Chicoreus* from Savai’l, Samoa

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ABSTRACT A new species of Muricidae, *Chicoreus* (*Triplex*) *tangaroai* is described from the Samoan Infraprovince. This new taxa is compared with *C.* (*T.*) *thomasi* (Crosse, 1872) and *C.* (*T.*) *lorenzi* Houart, 2009, related species in the Marquesan Molluscan Province.

KEY WORDS Muricidae, *Chicoreus*, *Chicoreus* (*Triplex*), *C.* (*T.*) *tangaroai*, Samoan Islands, Samoan Infraprovince of the Polynesian Molluscan Province

INTRODUCTION

Samoa, in the south-central Pacific, comprises five volcanic islands and two coral atolls (Swains and Rose Atolls) located approximately 3,400 km to the east of the Marquesas Islands (Marquesan Molluscan Province) and approximately 1,260 km west of Fiji (Tahitian Subprovince). These include the large subaerial islands of Savai'i and Upolu (independent nation of Samoa) in the west and Tutuila to the small island of Ta'u (American Samoa) in the east. The islands are situated near the southwest margin of the Pacific Plate comprising high volcanic mountains to the west that erode to the Rose Atoll in the east. Beyond the submerged reef banks that surround the islands, the ocean floor drops quickly to depths greater than 4,000 m (see Figure 1, Wright *et. al.* 2012; Seamounts, Ridges, and Reef Habitats of American Samoa). This topographical isolation supports a unique grouping of endemic molluscan species and its designation as the Samoan Infraprovince of the Polynesian Molluscan Province (Petuch & Berschauer, 2020). Here we describe a new species of *Chicoreus,* from this region. All of the specimens of the new species imaged here are in the collections of the authors. The new species is compared with two species closely resembling taxa, *Chicoreus (T.) lorenzi* Houart, 2009, and *Chicoreus (T.) thomasi* (Crosse, 1872). All three species are similar in size and form, but differ in their dentition, spine structure and relative siphonal canal length. These differences are discussed below and illustrated in the plates. The species *Chicoreus (T.) huttoniae* (Wright, 1878) is also discussed in relation to the new species.

Abbreviations.
Terminology used to describe the primary cords in Muricidae, based on Merle, 2001 and 2005.

P	Primary cord
s	secondary cord
ad	adapical
ab	abapical
SP	Subsutural cord
IP	Infrasutural primary cord (primary cord on subsutural ramp)

adis	adapical infrasutural secondary cord (on subsutural ramp)
abis	abapical infrasutural secondary cord (on subsutural ramp)
P1	Shoulder cord
P2-P6	Primary cords on the convex part of the teleoconch whorl
s1-s6	secondary cords on the convex part of the teleoconch whorl
ADP	Adapertural primary cord on the siphonal canal
s7-s9	secondary cords on the siphonal canal
MP	Median primary cords on the siphonal canal
ABP	Abapertural primary cord on the siphonal canal
ads	adapertural secondary cord on the siphonal canal
abs	abapertural secondary cord on the siphonal canal
ID	Infrasutural denticle
D1-D6	Abapical denticles

METHODS

Photographs were taken with a Canon EOS T3i using a 50 mm macro lens (set at f32 for 1.6 to 2.0 seconds) and a cable release, with the shell elevated over a black velvet background, set in a light tent with fixed flood lights and natural daylight bulbs.

Measurements were made using electronic dial calipers accurate to one hundredth of a millimeter. Overall shell length was measured from the tip of the protoconch straight to the distal tip of the siphonal canal. Shell width was measured at the widest point between the varices at the shoulder of the body whorl. The length of the siphonal canal was measured from the opening of the siphonal canal at the base of the aperture to the distal the tip of the siphonal canal.

The terminology used in describing *Chicoreus (Triplex) tangaroai* new species follows the terminology described by D. Merle (2001, 2005).

The holotype will be deposited in the type collection of the Division of Mollusks, Los Angeles County Museum of Natural History, Los Angeles, California ("LACM") and bears a LACM number.

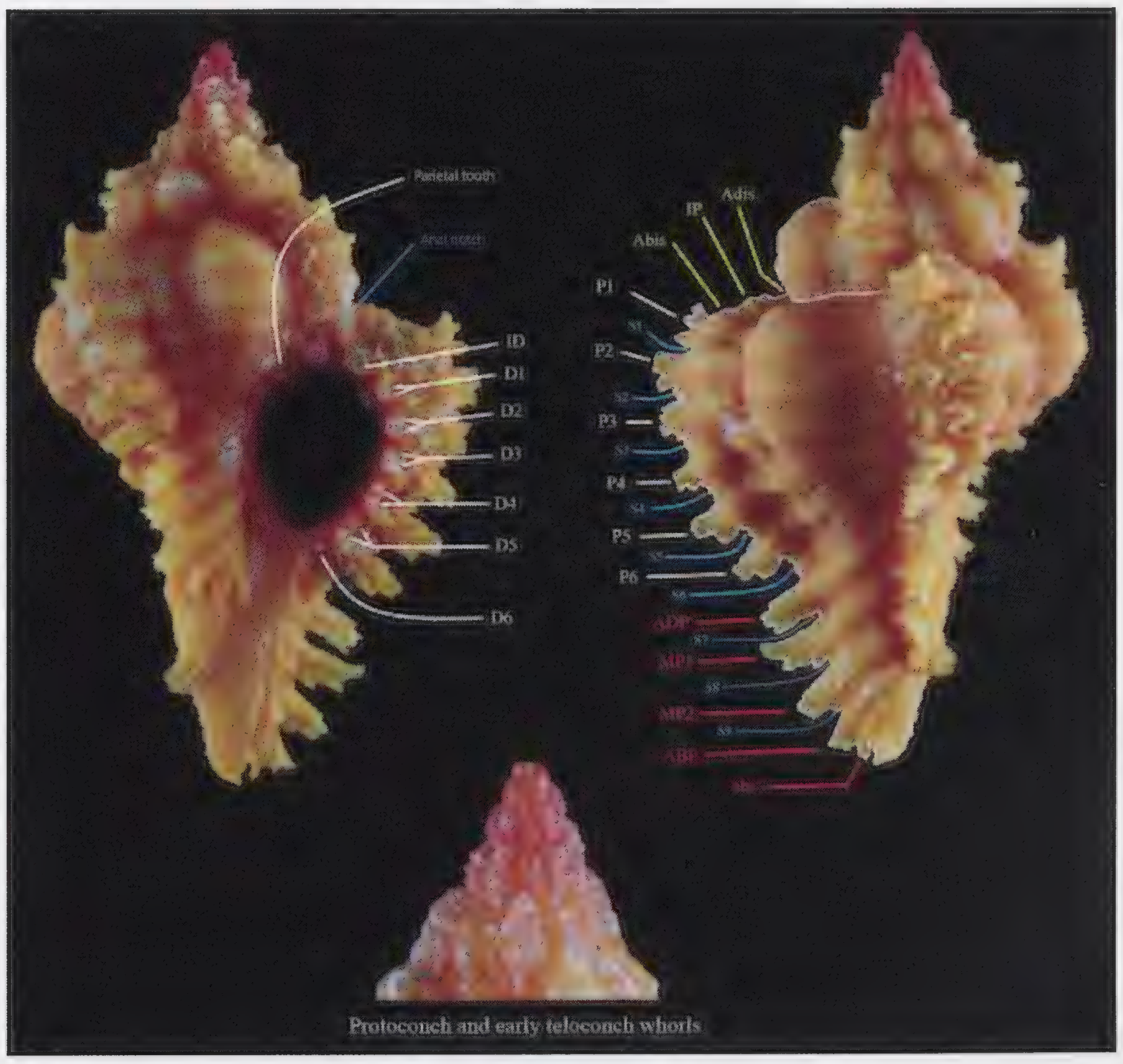

Figure 1. Terminology used in description of *Chicoreus* (*Triplex*) *tangaroai* new species (Paratype 6, apertural and abapertural views shown). The protoconch with 1.5 whorls and early teloconch whorls of the holotype (LACM 3784, measuring 46.08 mm in length) is shown at the bottom center of this Figure.

SYSTEMATICS

Class	Gastropoda
Infraorder	Neogastropoda
Superfamily	Muricoidea
Family	Muricidae
Subfamily	Muricinae
Genus	*Chicoreus* Montfort, 1810
Subgenus	*Triplex* Perry, 1810

Type species: *Triplex foliatus* Perry, 1810

Chicoreus (*Triplex*) *tangaroai* Berschauer, Waller & Maxwell, new species

(Figure 2 A-C; Plate 1, Figures A-D;
Plate 2, Figures A-B)

Description. Shell small to medium sized for the subgenus, stout, ovate, relatively broad at shoulder, frondose, with three high varices alternating with heavy, broad intervaricial ridges, strong sutural line, subsutural ramp weakly sloping and slightly concave; spire of moderate height, narrow and acute; protoconch bright pinkish-red consisting of 1.5 whorls; shell medium to dark orange; aperture relatively small, roundly ovate, cream-white inside, outer apertural lip bright pinkish-red; columellar lip bright pinkish-red with a weak elongate white parietal tooth at the adapical extremity; anal notch bright pinkish-red, moderately deep, obvious and broad; outer lip erect, crenulated, with seven short weak white denticles within: ID, D1 to D5 split by a pinkish-red depression, D6; siphonal canal relatively short 33.4% of shell length, broad, straight, weakly bent abapically; spiral sculpture consisting of P1 to P4 in early teloconch whorls, body whorl with adis, IP, P1, s1, P2, s2, P3, s3, P4, s4, P5, s5, P6, s6, ADP, s7, MP1, s8, MP2, s9, ABP, and abs cords ornamented with small squamose threads; P1 to P6, ADP, MP1, MP2, and ABP cords terminating in broad medium length frondose spines, of which P1 to P4 spines strongly frondose and compound; operculum dark brown, ovate, with subapical nucleus and numerous concentric ridges.

Type Material. Holotype: 46.08 mm in length and 22.96 mm in width, LACM 3784. Other Material Examined: Paratypes 1 to 5 in the collection of David P. Berschauer, measuring 34.9 to 46.6 mm in length. Paratypes 6 and 7 in the collection of David B. Waller, measuring 36.8 and 47.8 mm in length. Paratypes 8 to 10 in the collection of Valda Cantamesa, measuring 41.7 to 47.5 mm in length.

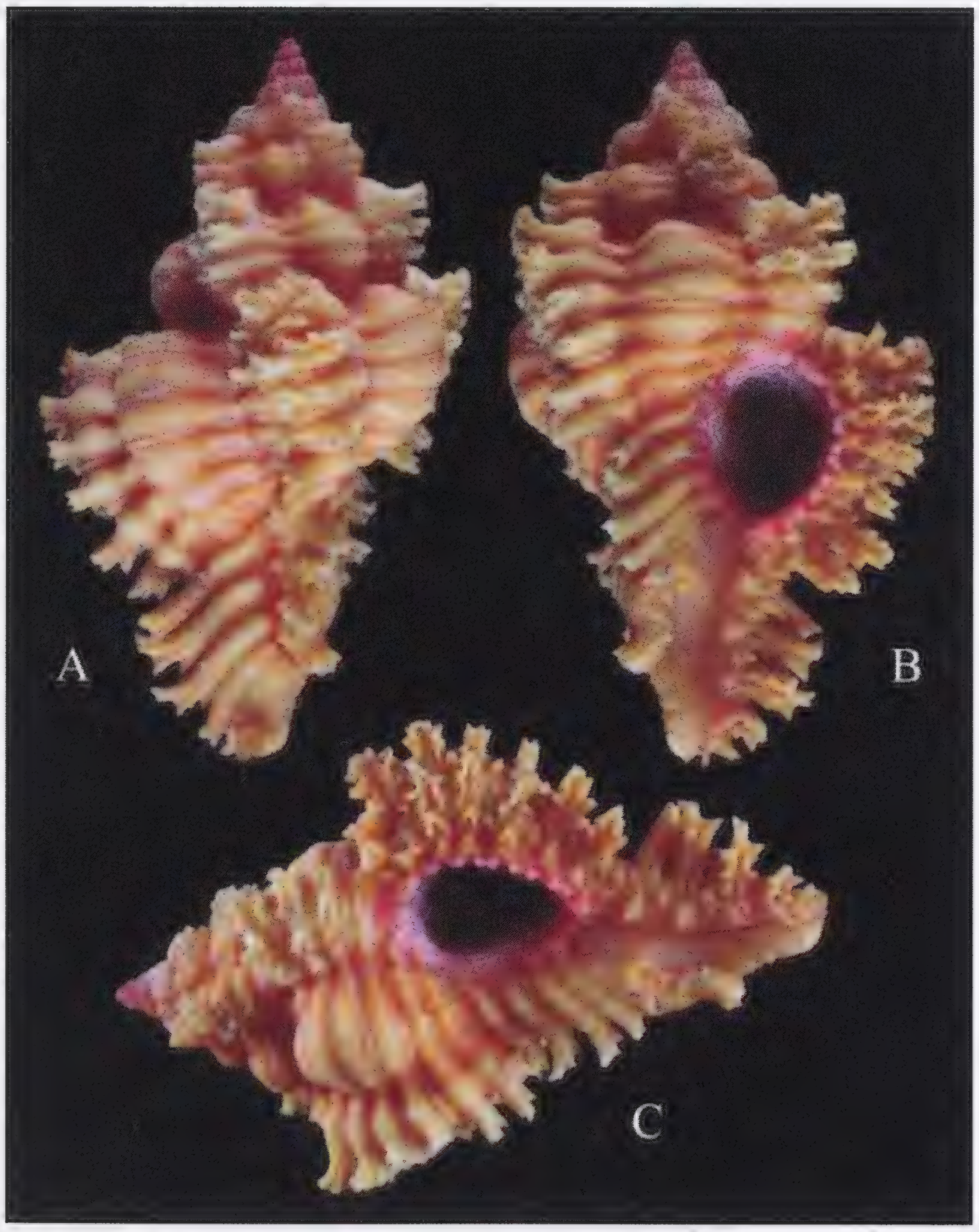

Figure 2. Holotype of *Chicoreus* (*Triplex*) *tangaroai* new species, 46.08 mm in length. **A**= abapertural view; **B**= apertural view; **C**= side view showing the edge of the lip and the strongly frondose and compound P1 to P4 spines.

Specimen	L Length (mm)	W Width (mm)	Siphonal Canal Length (mm)	Siphonal Canal SCL/L %	L/W Ratio
Holotype	46.08	22.96	15.39	33.39	1.54
Paratype 1	34.93	22.61	11.30	32.40	1.54
Paratype 2	44.94	30.26	15.08	33.55	1.49
Paratype 3	46.56	30.15	15.60	33.50	1.54
Paratype 4	42.50	28.34	14.10	33.18	1.50
Paratype 5	42.56	30.11	14.59	34.23	1.41
Paratype 6	47.80	30.40	15.50	32.43	1.57
Paratype 7	36.80	23.50	12.20	33.15	1.57
Paratype 8	47.53	31.90	15.62	32.86	1.49
Paratype 9	41.66	28.85	13.71	32.91	1.44
Paratype 10	43.15	27.96	13.60	31.51	1.54
			Average	33.01	1.51

Table 1. Measurements of type lot specimens examined.

Type Locality. Asau, Savai'l, Samoa, at 1-3 meters on a reef; associated with orange sponges.

Distribution. Appears to be endemic to the Samoan Infraprovince.

Etymology. In the Samoan Islands, Tangaroa was a god of creation - the being who formed the islands or who raised them up from the depths of the sea. This species is named for Tangaroa, the Māori god of the sea.

DISCUSSION

Chicoreus (*Triplex*) *tangaroai* has recently been marketed by shell dealers under the name *Chicoreus* (*Triplex*) *huttoniae* Wright, 1878, which is a taxon currently synonymized under *Chicoreus* (*Triplex*) *brunneus* Link, 1807. *Chicoreus huttoniae* is a much more elongated species with less frondose spines, being rather straight and simple in form, and the true *C. huttoniae* is likely a valid species which is endemic to New Caledonia (Plate 2, Figures C-D). In contrast, to the orange colour of all known *C. tangaroai*, and a colour that is ubiquitous with *C. huttoniae* leading to significant confusion, orange is considered a rare colour form in the wide spread Indo-Pacific species *C. brunneus*. Furthermore, *C. brunneus* (particularly attractive specimens of which are often mislabeled as *C. huttoniae*) differs from *C. tangaroai* in being larger in length, lacks the compressed form, and has a simplified frond structure (see Plate 2, Figures E-J). Given the high degree of variability in form found in *C. brunneus* over its broad geographic range from Mozambique, the Indian Ocean, and throughout the Indo-Pacific (Houart, 1992), it is probable that this is in fact a diverse complex of species, which currently remained synonymized, or lumped, under that name, and that further nuanced work will reveal many regionally distinctive species. Another important character is that this new endemic species *C. tangaroai* has only 1.5 protoconch whorls, whereas the wide spread *C. brunneus* is known to have two to three protoconch whorls (Houart, 1992). Further, a species locally known in Queensland, Australia, for decades as *Chicoreus huttoniae* (Plate 2, Figures K-L) was later named *Chicoreus akritos* Radwin & D'Attilio, 1976.

Chicoreus (*Triplex*) *tangaroai* differs from *Chicoreus (T.) thomasi* (Crosse, 1872) (Plate 1, Figures E-F) in that *C.* (*T.*) *thomasi* has a proportionately stouter shell with shorter siphonal canal. The spire of *C.* (*T.*) *tangaroai* is narrower than *C.* (*T.*) *thomasi*. In *C.* (*T.*) *tangaroai* the number of primary and secondary cords is similar to that in *C.* (*T.*) *thomasi*, however, the shape and length of the varical spines are longer, more frondose and elaborate. In *C.* (*T.*) *thomasi*, the varical spines at P1 to P4 are almost absent, with the P5 to P6 varical spines being present but short, whereas the varical spines of *C.* (*T.*) *tangaroai* at P1 to P6 are of medium length, strongly frondose and compound. Similar to *Chicoreus* (*Triplex*) *banksii* (G.B. Sowerby, II, 1841), *C.* (*T.*) *tangaroai* has two median primary cords (MP1 and MP2) on the siphonal canal compared to *C.* (*T.*) *thomasi*, which has one median primary cord. The siphonal canal in *C.* (*T.*) *tangaroai* is straight whereas there is a slight curve in the siphonal canal of *C.* (*T.*) *thomasi*. The dentition, apertural lip and columellar lip of *C.* (*T.*) *thomasi* are white to light pink, compared to *C.* (*T.*) *tangaroai* in which the apertural lip and columellar lip are a bright pinkish-red and the dentition is split with white tips separated by a shallow pinkish-red depression. While some split dentition can be observed in *C.* (*T.*) *thomasi* it has no split dentition at D4 to D5, a character which is consistently observed in *C.* (*T.*) *tangaroai*, and in *C.* (*T.*) *thomasi* the denticles are long and white and extend deep into the aperture. The columellar lip extends slightly onto the body whorl in *C.* (*T.*) *thomasi* whereas there is almost no extension of the columellar lip in *C.* (*T.*) *tangaroai*. The average length to width ("L/W") ratio of *C.* (*T.*) *tangaroai* is 1.51, in comparison to *C.* (*T.*) *thomasi* which has a L/W ratio of 1.57 as reflected in the specimens examined herein.

Chicoreus (*Triplex*) *tangaroai* differs from *Chicoreus (T.) lorenzi* Houart, 2009 (Plate 1, Figures G-H) in that *C.* (*T.*) *lorenzi* has a proportionately narrower shell and longer siphonal canal than *C.* (*T.*) *tangaroai*. The top of the body whorl slopes downward in *C. (T.) lorenzi* whereas in *C.* (*T.*) *tangaroai* the slope at the shoulder is significantly less. *C.* (*T.*) *tangaroai* differs from *C. (T.) lorenzi* in that it has only 1.5 protoconch whorls, whereas *C. (T.) lorenzi* has 3.5 to 3.75 protoconch whorls (Houart, 2009). In *C.* (*T.*) *tangaroai* the number of primary and secondary cords is similar to that in *C. (T.) lorenzi*, however the P1 to P4 varical spines in *C.* (*T.*) *tangaroai* are strongly frondose and compound in comparison to *C. (T.) lorenzi*. Similar to *Chicoreus* (*Triplex*) *banksii* (G.B. Sowerby, II, 1841), *C.* (*T.*) *tangaroai* has two median primary cords (MP1 and MP2) on the siphonal canal compared to *C. (T.) lorenzi* which has one median primary cord. The siphonal canal is straight in both species but is proportionately longer in *C. (T.) lorenzi*. The dentition, apertural lip and columellar lip of *C.* (*T.*) *lorenzi* are light pink, compared to *C.* (*T.*) *tangaroai* in which the apertural lip and columellar lip are a bright pinkish-red. In *C.* (*T.*) *lorenzi* the denticles are long and white and extend deep into the aperture with D1 to D4 split, whereas the dentition of *C.* (*T.*) *tangaroai* is short, confined to the outer edge of the aperture, D1 to D5 split with white tips separated by a shallow pinkish-red depression. The columellar lip extends slightly onto the body whorl in *C.* (*T.*) *lorenzi* whereas there is almost no extension of the columellar lip in *C.* (*T.*) *tangaroai*. The anal notch of *C.* (*T.*) *lorenzi* is light pink, broad and less defined than in *C.* (*T.*) *tangaroai* which has a more clearly defined and obvious pinkish-red anal notch. The average L/W ratio of *C.* (*T.*) *tangaroai* is 1.51, in comparison to *C.* (*T.*) *lorenzi* which has a L/W ratio of 1.88 in its holotype illustrated by Houart, 2009.

ACKNOWLEDGMENTS

We thank Paul Kanner for the loan of specimens of *Chicoreus (T.) thomasi* (Crosse, 1872) and *Chicoreus (T.) lorenzi* Houart, 2009, which he collected in Colette Bay, Huku Nivu, Marquesas. We thank Valda Cantamesa for the use of images of *Chicoreus akritos* Radwin & D'Attilio, 1976, which she collected in Queensland, Australia. We thank Roland Houart for personal communications on this matter, and for the use of the images of *Chicoreus* (*Triplex*) *huttoniae* Wright, 1878, which he labeled as an orange color form of *C. brunneus* from New Caledonia.

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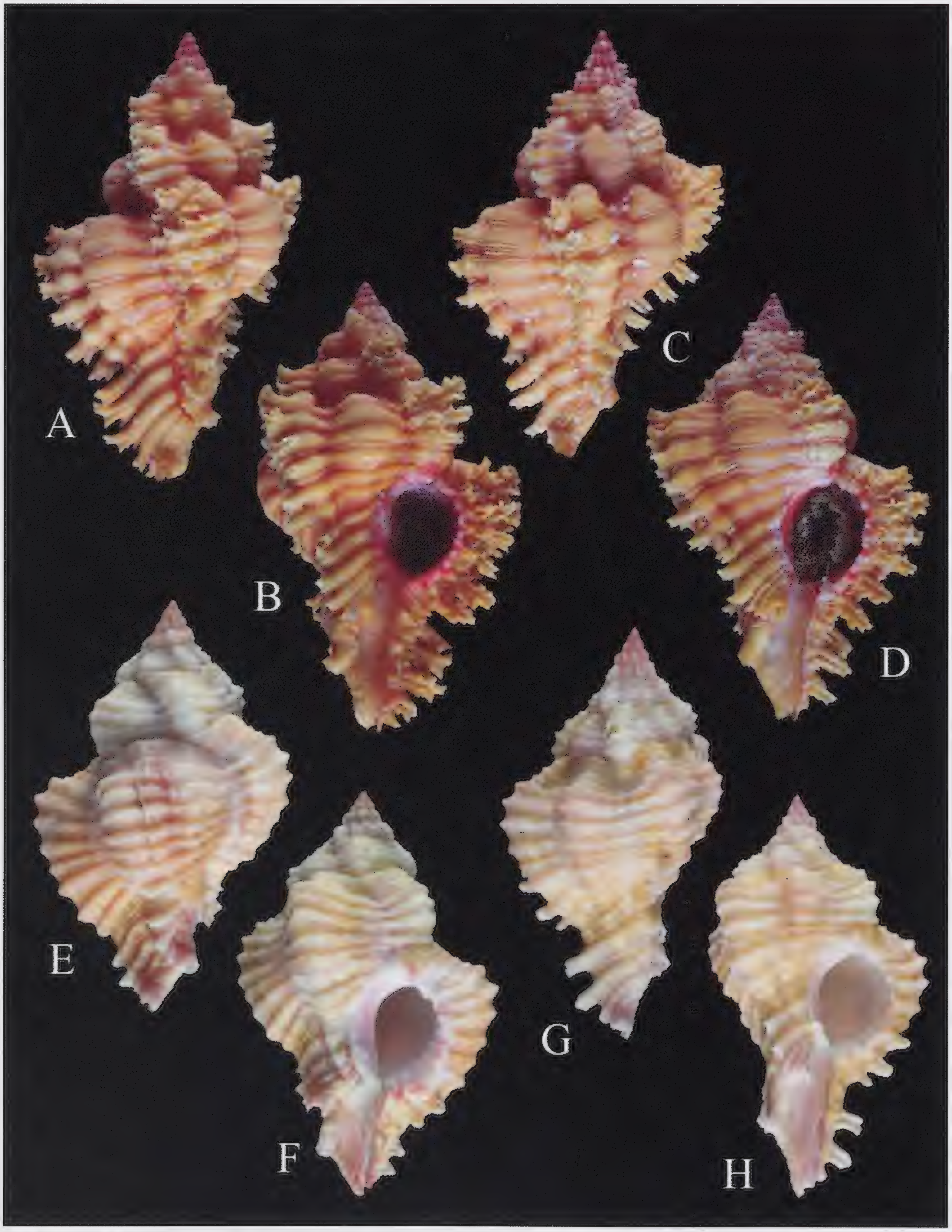

Plate 1. Comparison of *Chicoreus* (*Triplex*) *tangaroai* new species to similar species. A, B= *C.* (*T.*) *tangaroai*, Holotype measuring 46.08 mm in length, LACM No. 3784; **C, D=** *C.* (*T.*) *tangaroai*, Paratype 1 measuring 34.93 mm in length; **E, F=** *Chicoreus (T.) thomasi* (Crosse, 1872), measuring 45.43 mm in length, in the Collection of Paul Kanner, Colette Bay, Huku Nivu, Marquesas, by scuba at 15 to 20 m depth; **G, H=** *Chicoreus (T.) lorenzi* Houart, 2009, measuring 34.46 mm in length, in the Collection of Paul Kanner, Colette Bay, Huku Nivu, Marquesas, by scuba at 15 to 20 m depth.

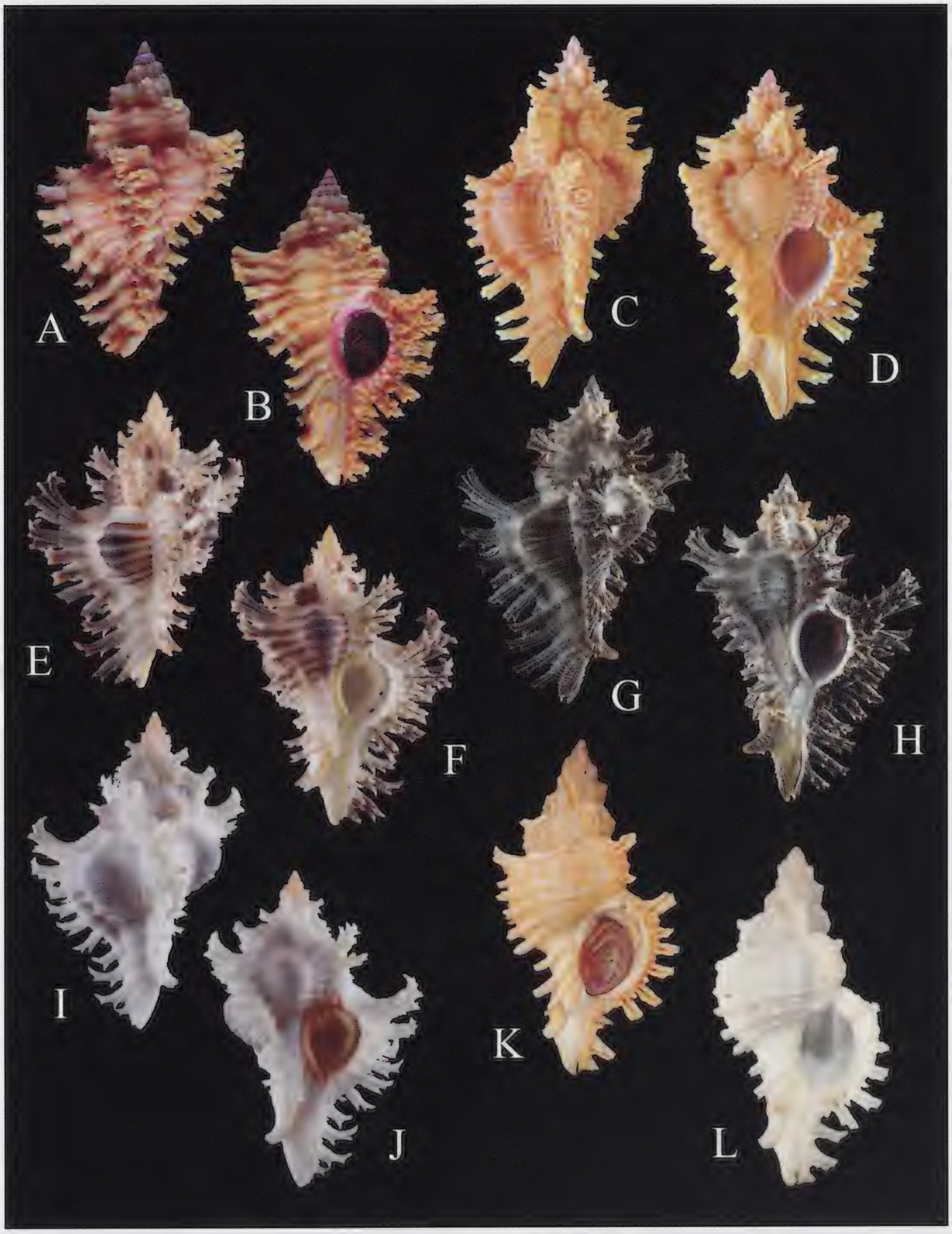

Plate 2. Comparison of *Chicoreus* (*Triplex*) *tangaroai* new species to other species mislabeled as "huttoniae". A, B= *C.* (*T.*) *tangaroai*, Paratype 5 measuring 42.56 mm in length, in the Collection of David B. Waller; **C, D**= *C.* (*T.*) *huttoniae* Wright, 1878, from New Caledonia measuring 45.3 mm, in the Collection of Roland Houart; **E, F** = *C.* (*T.*) *brunneus* Link, 1807, from the Philippines measuring 43.3 mm in length, in the Collection of David B. Waller; **G, H** = *C.* (*T.*) *brunneus* Link, 1807, from the Philippines measuring 49.2 mm in length, in the Collection of David B. Waller; **I, J**= *C.* (*T.*) *brunneus* Link, 1807, from the Philippines measuring 44.2 mm in length, in the Collection of David B. Waller; **K**= *Chicoreus akritos* Radwin & D'Attilio, 1976, measuring 65.8 mm in length, from Queensland, Australia, in the Collection of Valda Cantamesa; **L**= *Chicoreus akritos* Radwin & D'Attilio, 1976, measuring 51.7 mm in length, from Queensland, Australia, in the Collection of Valda Cantamesa.

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Studies in *Canarium urceus* (Linnaeus, 1758) Part 6: A new *Canarium* species from the Andaman Sea (Gastropoda: Strombidae) and discussion on related species

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ABSTRACT This part of the *Canarium* (*Canarium*) *urceus*-complex (Linnaeus, 1758) review after Abbott's revision (Abbott, 1960) revision examines material from the Andaman Sea. At present, material from that region has been synonymised under the name *Canarium* (*Canarium*) *urceus* (Linnaeus, 1758). *Canarium* (*Canarium*) *andamanense* new species is known from the Andamanian Subprovince, a semi enclosed basin that is centered on the Andaman Sea and enclosed by the west coasts of Myanmar and Thailand and the Mergui Archipelago in the east, to the northern Malacca Strait in the south, and to the Andaman and Nicobar Islands in the west. This species is recognized and differentiated by solid, sturdy shells with a triangular body whorl, large knobs on the shoulder and bright orange aperture. This study further confirms that there is a high degree of bioregionalisation within the *Canarium* complex.

KEYWORDS Andamanian Subprovince, *Canarium, Canarium urceus*-complex*,* *C. urceus*, *Strombus*, taxonomy, Thailand

INTRODUCTION

Until recently *Canarium* (*Canarium*) *urceus* (Linnaeus, 1758) was previously though to be a single species centred within the Indo-Australian Archipelago realm (Abbott, 1960). Historically, the species complex of *C. urceus* has been poorly understood. Abbott (1960:63-64) in his monograph on the family Strombidae struggled with the diversity within the complex, and the modern interpretation of this complex is very different. Within Abbott's approach there was hardly any available taxonomic space to identify these geographical races as species within a species complex. More recent revisions have brought a more nuanced understanding of this species complex resulting in the identification of taxa, which have either been buried within the synonymy of *C. urceus* or remained unrecognized (Maxwell *et al.* 2020a; 2020b; Dekkers and Maxwell 2020).

This is the sixth part in a series of papers unravelling the *urceus*-complex based on the morphology and biogeography of the group. Previous studies have found the *urceus*-complex to be represented by regionalized species, in contrast to the single species concept, which dominated prior taxonomic thinking, and thereafter the approach taken by Abbott (1960). The species complex has been strongly affected by the interglacial cycles (Pleistocene-Holocene) where there have been periods of isolation and recombining events that have affects the long-term evolution and diversification within the complex. This process has left artifacts in the morphological expression of some phenotypes, such as shared infrequent apertural colour forms.

One such colour form is the black aperture, another is the solid yellow shell, while a consistently present phenotype in some species, is to be considered a post divergence artifact that either has remained fixed within certain biogeographical zones or is refreshed as migrants from other regions reticulate with localized populations. One must realize that there are very few fossils known in the *Canarium (C.) urceus* group (*Canarium bawenauruensis* Wissema, 1947; Pliocene/Pleistocene of Bawonauru, Nalawo Valley, Nias Island, North Sumatra Province, Sumatra Island, Indonesia; several other forms kept in Naturalis under incorrect names, from West Timor, Indonesia, and *Canarium (Canarium) plicatus* var. *ustulatus*; Pleisto-Pliocene; Nias Island, North Sumatra Province, Indonesia). These fossil appearances will be discussed in a later paper (in preparation). The radiation of species within the *urceus*-complex is very young geologically, not unlike what has occurred in the larger Pacific Costellariidae.

While previous studies have given attention to species from bioregions centered on Australia (Maxwell *et al.* 2021), Indonesia (Maxwell *et al.* 2020a), Japan and the north-western Pacific (Maxwell *et al.* 2021), New Guinean regions (Dekkers and Maxwell 2020), Philippines (Maxwell *et al.* 2020a), Singapore and Vietnam (Maxwell *et al.* 2020a) and the south-western Pacific (Dekkers and Maxwell 2020), this study focuses on the Andamanian Subprovince. This region is a semi enclosed basin that is centred on the Andaman Sea and enclosed by the west coasts of Myanmar and Thailand and the Mergui Archipelago in the east, to the northern Malacca Strait in the south, and to the Andaman and Nicobar Islands on the west (Petuch and Berschauer 2020; Figure 1).

ABBREVIATIONS

AMD	Aart M. Dekkers Collection, Purmerend, the Netherlands.
MNHN	Musée National d'Histoire Naturelle, Paris, France.
MUZEE	Collection of the MUZEE Museum, Scheveningen, the Netherlands.
HD	Henk Dekker Collection, Winkel, the Netherlands
LvG	Leo and Wil van Gemert Collection, Zeist, the Netherlands
NBC	NBC Naturalis: Naturalis Biodiversity Center, Leiden, The Netherlands.
PB	Peter Breeman, Inzemont, Belgium.
SMC	Stephen J. Maxwell Collection, Cairns, Queensland, Australia.

METHODS

Approximately one hundred specimens were examined, and locality data mapped (Figure 1). Locality records were divided into two categories: first, literature records; and, second, material at hand. There are two limitations on the use literary records, particularly where there are no accompanying illustrations: first, the correctness of the species identification cannot be confirmed; and second, accuracy of the data provided with each specimen cannot be guaranteed. This geographical information and the morphological differences with outer described taxa provided the basis for the description of this species.

The decision to use the rank of species or subspecies is based on Maxwell and Dekkers (2019) and Maxwell *et al.* (2021). Under this system, the subspecies rank should be restricted to those taxa where there are no other forms of discrimination other than phenetic differences in genetic sequences.

SYSTEMATIC PART

Superfamily	Stromboidea Rafinesque, 1815
Epifamily	Neostromboidae Maxwell, Dekkers, Rymer & Congdon, 2019 (Phylocode)
Family	Strombidae Rafinesque, 1815
Genus	*Canarium* Schumacher, 1817
Subgenus	*Canarium* Schumacher, 1817

Canarium (*Canarium*) *andamanense*

Dekkers, Dekker & Maxwell, new species

(Figure 2 A-H)

Description. Rather large, solid, and sturdy shells for the genus. Size roughly between 30 - 60 mm. Spire roughly 1/3 of total height. Shell form with broad cone-like body whorl bearing strong knobs on the shoulder, usually 3 dorsally, 4 shallower ones ventrally (which are the prolongation of the small knobs on the shoulder of the earlier whorls) and one in between them. Spire with some minor old varices. Approximately 8 whorls. Apex sharp and pointed, though usually worn off. Body whorl covered with many very narrow spiral lines giving the shell a silky look. Several stronger ones on regular distance, whiter and a bit more raised. Spiral lines becoming courser and flattish towards the anterior part, about 12-14 in total. Aperture pinched at the posterior end forming a shallow channel and with a wide bulge on the shoulder. Labrum straight and almost not protruding, the last part to the rim has a faint orange colour like the aperture. Columella smooth, except for the posterior end which has some 4 lirae and the anterior part which bears up to around 10 small lirae, all in the same colour as the columella itself. Columella dark yellow to bright orange. Interior of the labrum the same colour as the columella, bearing numerous thin lirae entering the deeper aperture. The lirae are simple, not forked, and becoming dark brown to black after about 4-5 mm, roughly for about 10 mm into the shell interior. At the anterior end, the anterior channel, the colour becomes solid black. Basic colour dirty white. Random patches of light brown, greyish-blueish and greenish colour on the body whorl.

Type Material. Holotype – NCB RMNH.MOL.511430, 47.8 mm (ex. AMD)
Paratype 1 – MNHN-IM-2016-5343, Phuket, 45.8 mm (ex. AMD)
Paratype 2 – Phuket, Thailand, 44.2 mm (AMD STR2110a)
Paratype 3 – Phuket, Thailand, 48.2 mm (AMD STR2110b)
Paratype 4 – Phuket, Thailand, 40.5 mm (AMD STR2110c)
Paratype 5 – Campbell Bay, Great Nicobar Island, 44.5 mm, 1970 (SMC 19i.001a);
Paratype 6 – Campbell Bay, Great Nicobar Island, 45.5 mm, 1970 (SMC 19i.001b);
Paratype 7 – Campbell Bay, Great Nicobar Island, 44 mm, 1970 (SMC 19i.001c);
Paratype 8-10 – Noppharat Thara Beach, Krabi, Thailand, 33.5 , 45,3 , 45.9 mm (HD 1031);
Paratype 11-13 – Ban Khao Thong Tai, Krabi, Thailand, 43.5 , 46.6 , 50.1 mm (HD 46895);
Paratype 14-16 – near Krabi, Thailand, 46 , 52 , 53 mm (LvG, largest 3 of 5 specimens);
Paratype 17 – Ao Nang Beach, Krabi, Thailand, 58 mm (PB 1718);
Paratype 18 – Phuket, Thailand, 41,2 mm. (AMD STR4004)
Paratype 19-24 – Phuket, Thailand, 41.3 to 51.8 mm (AMD STR0985)

Type Locality. Phuket, Thailand.

Diagnosis. Solid, sturdy shells with triangular body whorl, large knobs on the shoulder and bright orange aperture. Body whorl covered with many very narrow spiral lines.

Etymology. The name is derived from the sea - Andaman Sea - and latinized to read *andamanense*. The name is coming from the labels of the shells in the collection of Henk Dekker (second author). He had separated them for decades in his collection under this name, as a future manuscript name which was never written, until now.

Locality Records. Literary Records: Indonesia – north-western Sumatra, mapped only (Abbott 1960). Material Examined: India – Campbell Bay, Great Nicobar Island (SMC x 3); Phuket, Thailand (AMD 20x, 11x, all 31 ex MUZEE collection); Ban Khao Thong Tai, Krabi (HD, 3x, Thailand trip 1996, Station 25, collected HD , S. Dekker and C. Dekker-Rentenaar); Noppharat Thara Beach, Krabi, Thailand, (HD, 3x, Thailand trip 1996, Station 21, collected HD , S. Dekker and C. Dekker-Rentenaar) (PvB 18x, self-collected); Ban Ko Kwang, Krabi, beached. (HD, 8x Thailand trip 1996, Station 22, collected HD, S. Dekker and C. Dekker-Rentenaar); Ko Sire, Ban Laem Tukkae, Ko Phuket, Phuket Bay (HD 2x, Thailand trip 1995, Station 23, collected HD, S. Dekker and C. Dekker-Rentenaar); Bna Ko Kwang on sandflats with coral growth, rocks and mangroves (HD 2x, Thailand trip 1998, Station 21, collected HD, S. Dekker and C. Dekker-Rentenaar); Ko Lanta, Beached (HD 4x, leg. H. Kamphuis-Hensel, Nov. 2020); Ao nang Beach, Krabi, Thailand (PvB 1x, self-collected, paratype); near Krabi, Thailand (LvG, 5x, self-collected (paratype 15 and 16 included).

Comparison. The species is large for the species-group, very knobby and with a bright orange aperture. The silky appearance of the shell caused by the many thin spiral lines is also remarkable and lacking in all other species. The large and knobby form is only found in the black-mouthed *C.* (*C.*) *urceus*, not in other species as for example the most encountered species in collections *C.* (*C.*) *esculentum* Maxwell, Rymer, Congdon & Dekkers, 2020. Most species in the urceus-complex are smaller than the new species. There are some other species that have orange or red in the aperture, like *C.* (*C.*) *incisum* (Wood, 1828) and *C.* (*C.*) *anatellum* (Duclos in Chenu, 1844). *Canarium* (*C.*) *incisum* differs in a much smaller size and darker coloured spire whorls and having small shoulder knobs; it is also more triangular. *Canarium* (*C.*) *anatellum* differs in having a more double fusiform shell lacking knobs on the body whorl.

Variability. The species can be rather variable in size and broadness of the shells. This might be a case of sexual dimorphism. Small shells around 30-40 mm might be the males, with the females up to 55-60 mm in length and with the broadest shape. This is speculation of course; it is not tested yet. In the shells personally collected by the second author and our Dutch friends, the variation in size is always present. The large showy shells bought in the shell shop of MUZEE (HD, AMD) are all large and broad examples and were selected probably. Intermediates with *C.* (*C.*) *esculentum* showing thin black colour around the aperture are commonly found (see under). In old examples found beached the aperture can lose it bright orange colour. Paratype 4 has a full orange shell and that variant is also in the collection HD. Paratypes 11-13 are more slender and with small or no knobs, looking more like *C.* (*C.*) *esculentum*. These were beach collected and *C.* (*C.*) *esculentum* does not live at the west coast of Thailand.

DISCUSSION

The species lives in a small range from Phuket to a few hundreds of kilometers southwards. We do not know if it lives further north too, we do not have records from there, only one from India (SMC). Further south from Phuket and on the islands offshore, the species is not collected.

The second author and his family and our Dutch friends Leo and Wil van Gemert and Peter Breeman have personally collected the orange mouthed species *C.* (*C.*) *andamamense* from the local southern surroundings of Phuket. Offshore island and further south, the species is replaced by the fully black mouthed *Canarium* (*C.*) *urceus* Linnaeus, 1758 (synonym: *C.* (*C.*) *ustulatus*) Schumacher, 1719; Maxwell *et al.* 2020), which is very curious. Some of the smaller collected beached specimens show thin black lined orange apertures and these are an example of expression of the phenotype of *Canarium* (*C.*) *urceus*. The few examples of these intermediate shells are not included in the listed numbers of studied shells, nor included on the plates. This intermediate phenomenon will be discussed in detail in a future paper (in preparation).

The small range of the new species seems difficult to understand at first sight. The species of the *urceus*-complex recognized in our earlier papers (and in the future ones) have almost all very limited distribution. In that light, it is no surprise we have encountered another species with a very limited distribution. The *urceus*-complex does not stand alone in this. Even in fishes we see those surprising, limited distributions (Borsa *et al.*, 2016). In these blue-spotted maskrays, eight clades are recognized based on molecular research within (roughly) the Coral Triangle including a clade in the same small area from Phuket south to north-western Sumatra.

ACKNOWLEDGEMENTS

The authors thank our Dutch friends Leo and Wil van Gemert and Peter and Margareth Breeman for allowing us to study the self-collected shells of the new species in their collections. Together with the shells collected by the second author and his late parents, we have first-hand reliable collecting data which is a great help in understanding the distribution pattern of the new species.

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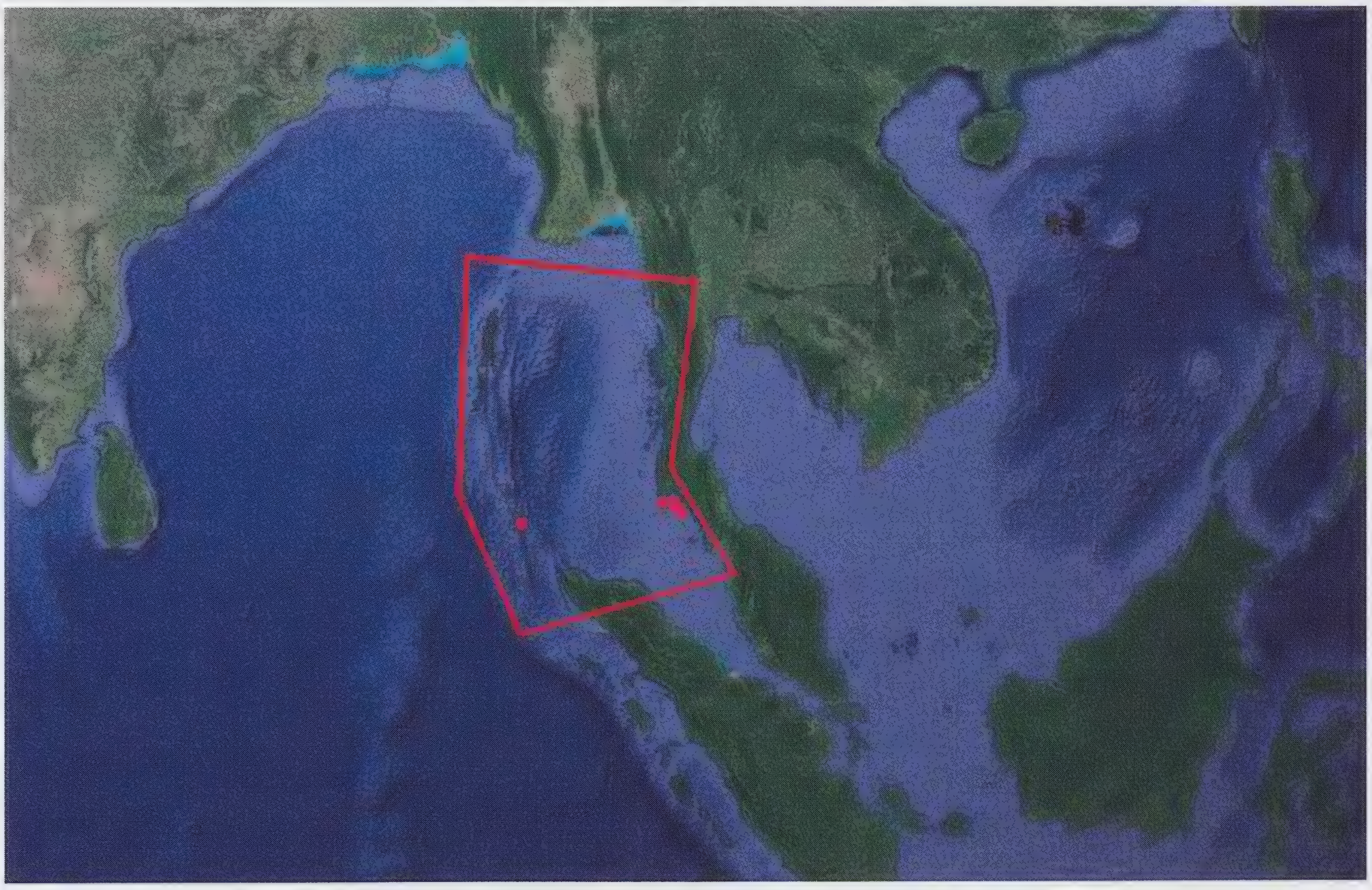

Figure 1. The far western part of the Indo-Australian Archipelago with the Andamanian Subprovince outlined. The locations of *Canarium andamanense* new species examined are marked by dots (image modified from Google Earth, accessed August 2021).

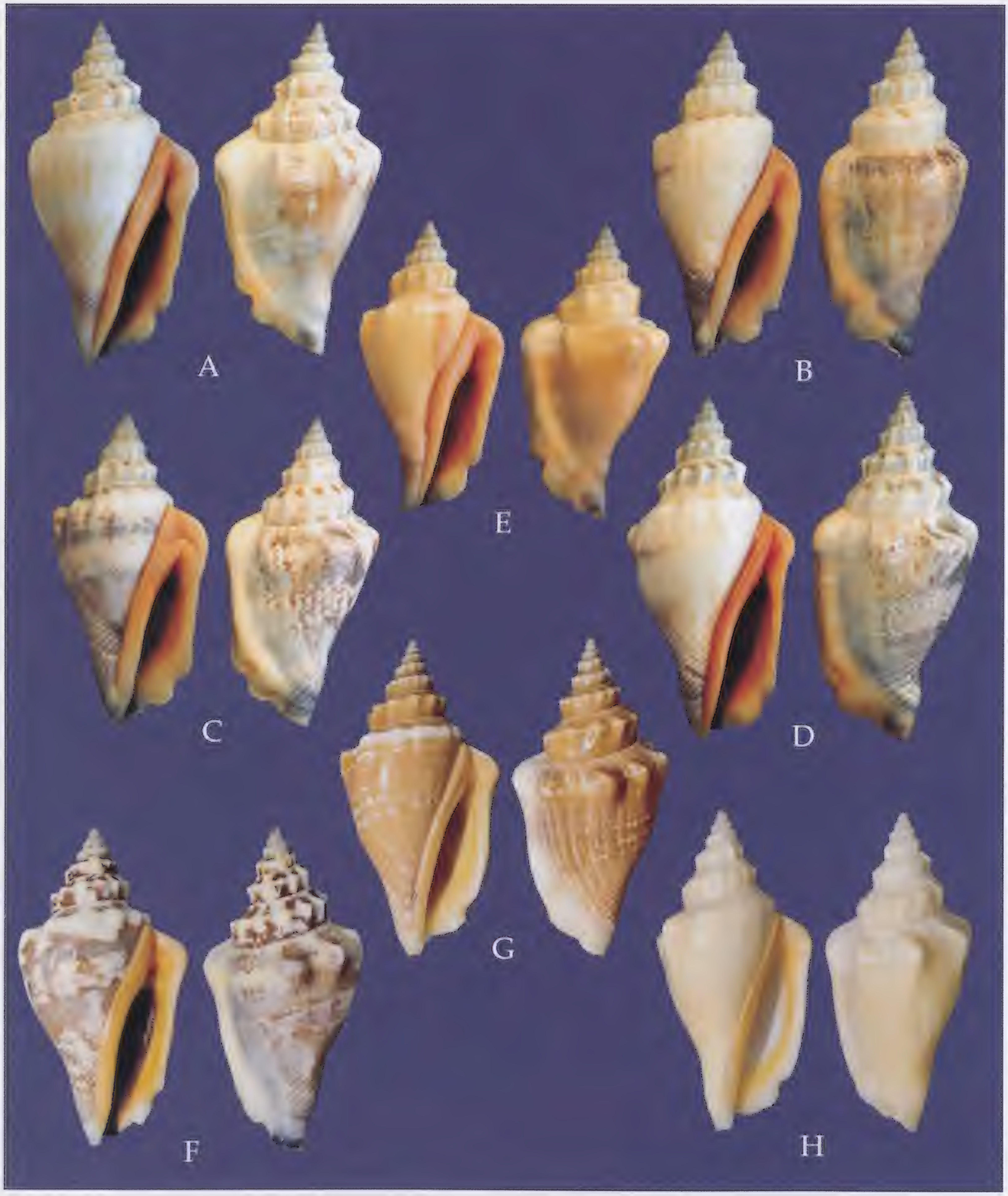

Figure 2. Types of *Canarium andamanense* new species.
A= Holotype – NCB RMNH.MOL.511430 47.8 mm; **B**= Paratype 1 – MNHN-IM-2016-5343, Phuket, 45.8 mm; **C**= Paratype 2 – Phuket, Thailand, 44.2 mm (AMD STR2110a); **D**= Paratype 3 – Phuket, Thailand, 48.2 mm (AMD STR2110b); **E**= Paratype 4 – Phuket, Thailand, 40.5 mm (AMD STR2110c); **F**= Paratype 5 – Campbell Bay, Great Nicobar Island, 43.5 mm, 1970 (SMC 19i.001a); **G**= Paratype 6 – Campbell Bay, Great Nicobar Island, 44 mm, 1970 (SMC 19i.001b); and **H**= Paratype 7 – Campbell Bay, Great Nicobar Island, 44.2 mm, 1970 (SMC 19i.001c).

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Description of two new Conidae subspecies, from KwaZulu-Natal, South Africa

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ABSTRACT Two new Conidae subspecies, *Nataliconus immelmani alanfraseri* and *Floraconus baeri desuntnotae* from the Eastern area of South Africa are described.

KEYWORDS *Nataliconus*, *Floraconus*, *alanfraseri, desuntnotae, baeri*, *immelmani*, Richards Bay, KwaZulu-Natal

INTRODUCTION

A truly spectacular, recent *Nataliconus* discovery has been made while dredging in deeper water off southern KwaZulu-Natal.

Two specimens labeled "*Conus catus*", which were dredged in deep water off Richards Bay many years ago, represent an interesting, more southern subspecies of the rare *Floraconus baeri.*

ABBREVIATIONS AND ACRONYMS

Coll:	Collection of
NMSA-Mol	Natal Museum Pietermaritzburg, South Africa

MATERIAL AND METHODS

Systematics for this paper is based on the work of Monnier, *et al.*, A Taxonomic Iconography of Living Conidae, published in 2018.

Photographic images for Plate 1, Figure 2, Plate 2, Figure 4, and Plate 3, Figures 1, 5, 6 were photographed by Mark Page with a Canon 800D utilizing a dedicated photographic table with adjustable overhead arm. The lens utilized was a Canon 50 mm Macro lens. White LED photographic lamps were utilized for lighting with customized, in-camera white balance. Darktable Elements sotfware was utilized to crop and orientate the images.

All other images in the article were supplied by A. Seccombe.

SYSTEMATICS

Family Conidae Fleming, 1822
Genus *Nataliconus* Tucker & Tenorio, 2009

Nataliconus immelmani alanfraseri
A. Seccombe and R. Aiken, new subspecies
(Figure 1; Plate 1; Plate 2, Figure 1;
and Plate 3, Figures 1-2)

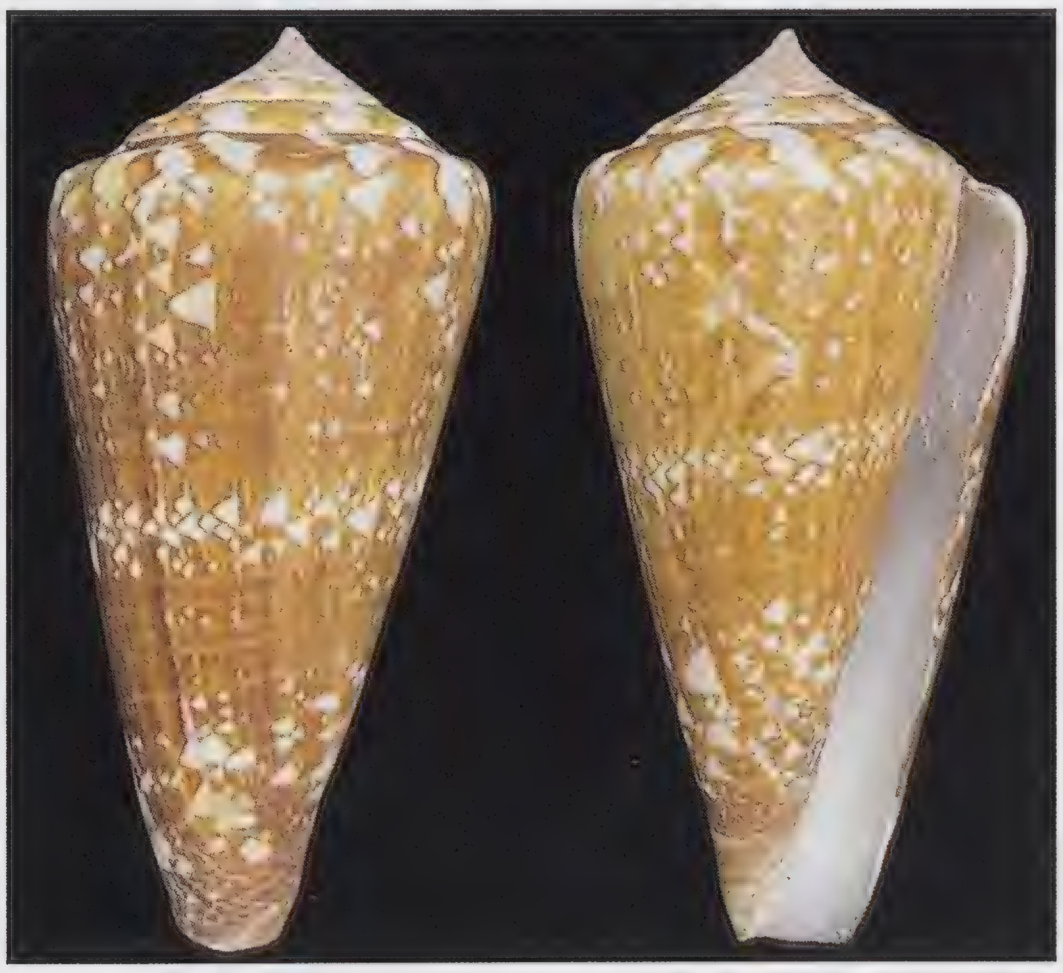

Figure 1. *Nataliconus immelmani alanfraseri* n. subsp. holotype.

Description. Shell lightweight and large, ranging from 85 to 110 mm. Shape conical with straight sides. Shoulder rounded; spire moderately depressed with shallow but distinct stepping. Suture indented, spire whorls convex with noticeably pink protoconch and teleoconch whorls. Spire pattern characterised by attractive, evenly spaced patches of white and brown colour. Body whorl is of chocolate brown, interspersed with radial white 'tenting' that covers the entire whorl, but is sparser on mid-whorl and in the lower third, creating two mottled bands of brown.

Type material. The type material of *Nataliconus immelmani alanfraseri* is as follows:

Holotype:	77 x 37.6 mm. (Plate 1, Figure 1). NMSA-Mol OP 1954/T4530. by A. Seccombe.
Paratype 1:	72 x 35 mm. (Plate 1, Figure 1). Coll: A. Seccombe.
Paratype 2:	96.5 x 48.6 mm. Coll: A. Seccombe.
Paratype 3:	99 x 49 mm. (Plate 1, Figure 3). Coll: A. Seccombe.
Paratype 4:	71.9 x 33.6 mm. (Plate 1, Figure 4). Coll: A. Seccombe.
Paratype 5:	66.8 mm. Coll: A. Seccombe. (Figure 1; Plate 1, Figure 5)
Paratype 6:	71 mm. Coll: A. Seccombe. (Figure 1; Plate 2, Figures 1-2)
Paratype 7:	44.6 mm. Coll: A. Seccombe.
Paratype 8:	93.1 mm. Coll: A. Seccombe.
Paratype 9:	78.5 mm. Coll: A. Seccombe. (Plate 3, Figure 2)
Paratype 10:	86.9 x 44.2 mm. (Plate 1, Figure 6). Coll: A. Seccombe.
Paratype 11:	100.2 x 51.3 mm. (Plate 1, Figure 2). Coll: R. Aiken.
Paratype 12:	Projected size 93 mm. (Plate 3, Figure 1). Musselcracker "victim"; Coll: R. Aiken.

Type Locality. The Type material was collected off southern KwaZulu-Natal.

Distribution. Taken in 70-110 metres off a specific area in Southern KwaZulu-Natal.

Etymology. This attractive subspecies is named for its discoverer, Alan Fraser.

DISCUSSION

Although clearly distinctive, the authors introduce this magnificent cone currently as a subspecies. It is possible to distinguish it by the following factors when compared with its more southern congener, *N. immelmani immelmani* Korn, 1998 (Plate 2.3, Plate 3.3-4).

The new northern subspecies *N. immelmani alanfraseri* differs from its southern sibling *N. immelmani immelmani* in the following ways:

1. It is larger on average with individuals reaching 100 to 110 mm.
2. It is lighter in weight, possibly because of a much deeper water habitat. Lussi, with Steyn in their 2005 Offshore Shells of Southern Africa (2005), allude to *immelmani immelmani* as "shell fairly solid and heavy."
3. The colouration of spire whorls is an evenly spaced pattern of equal sized rounded brown and white patches, compared with the sporadic white flecking in *immelmani*. In particular, *alanfraseri* has distinct pink teleoconch whorls.
4. There are virtually no radial darker brown lines on the whorl, as with *immelmani immelmani*.
5. It is found at depths of 70 to 100 metres. *N. immelmani immelmani* was obtained by Scuba at a depth of 20 to 25 metres on low to medium profile reef in narrow crevices. Personal

communication with J.P. Giraud. This suggests a different habitat for *alanfraseri*.

6. It is separated from *immelmani immelmani* by a well-known 'geological break', created by the pinching of the continental shelf at the Umzimvubu River/Mzamba. Both F. Lorenz (2018) and S.G. Veldsman (2017) allude to this narrowing, and its influence on dividing the fauna of Pondoland (*immelmani immelmani*) and KwaZulu-Natal, where it seems that sometime back in malacological history, it has created the separation of many species (personal communications, F. Lorenz, and S.G. Veldsman).

7. The pattern of white radial 'tenting' is visible on a great percentage of the whorl. The southern *immelmani immelmani* is seen by the likes of Monnier *et al.*, as "a brown shell with a central pale band." In regard to colour and pattern, in this paper, we refrain from using the word 'background', as Lussi & Steyn in fact see the opposite, *i.e.*, *immelmani immelmani* being a white shell with brown background. This is also how Tenorio and Monteiro describe the species colour in their Iconography on South African Conidae. They illustrate the Holotype of *immelmani immelmani*, "from Southern Natal" on page 24, Figure 8A. This specimen is not likely from Natal at all, and bears the classic shape and colour pattern of shells from Pondoland (Transkei).

There are some *N. royaikeni* (S.G. Veldsman, 2010) (Plate 3, Figures 5-6) with somewhat similar pattern, but the latter is always much smaller, and extremely varied pattern-wise, as opposed to the highly consistent colour and pattern of both *immelmani*'s subspecies.

It can also be compared with *Leptoconus amadis* Gmelin, 1791 (Plate 2, Figures 3-4) (as has been done by Lussi, and Tenorio & Monteiro), but *amadis* has an angular shoulder and different sculpture on the spire.

Genus *Floraconus* Iredale, 1930

Floraconus baeri desuntnotae

A. Seccombe and R. Aiken, new subspecies

(Figure 2, Plate 4)

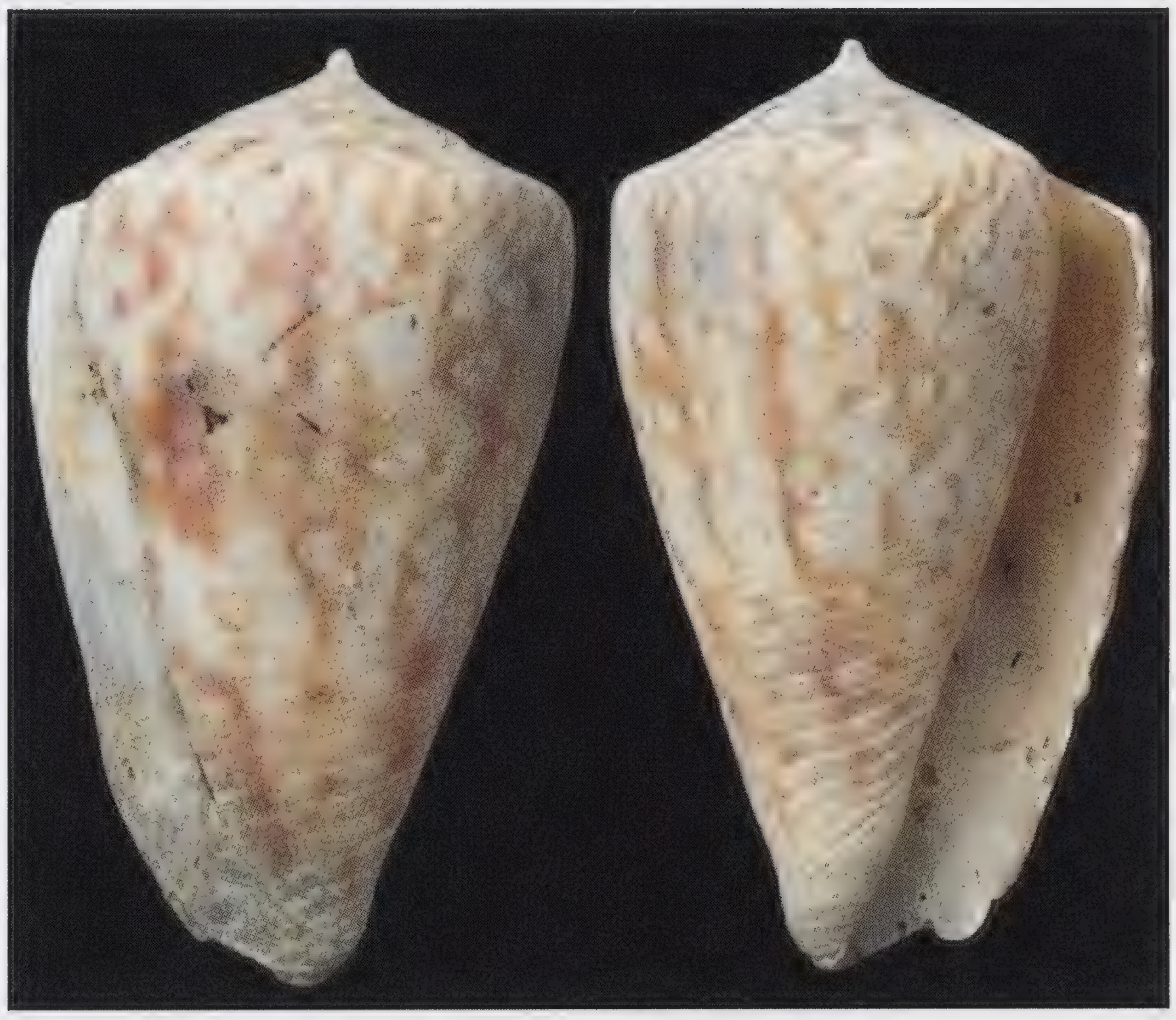

Figure 2. *Floraconus baeri desuntnotae.*

Description. Shell medium sized, 32.5 to 35.0 mm. Shape conical with flattened spire. Profile straight, only curved near the shoulder. Strong, flat spiral grooves cover the lower 60 percent of the whorl. Sutural ramp has weak spiral grooving. Aperture broadens anteriorly. Background colour white, overlaid by a series of jagged initially thin, but broadening, brown axial 'flames' from suture to base. Curiously, however, these axial markings encompass closed circles of the background colour, a most unusual feature.

Type material. The type material of the holotype and paratype of *Floraconus baeri desuntnotae* are as follows:

Holotype:	32.5 x 19 mm. (Plate 4, Figure 2) NMSA-Mol OP 1953/T4530, by R. Aiken.
Paratype 1:	35 x 20 mm. Coll: A. Secombe. (Plate 4, Figure 1)

Type Locality. The holotype (Plate 4 Figure 1) and paratype (Plate 4, Figure 2) were dredged off Richards Bay, KwaZulu-Natal.

Distribution. Dredged in deep water off Richards Bay, South Africa.

Etymology. Latin: *desunt notae*. “Known deficiencies”, alluding to the virtual absence of spiral dashes.

DISCUSSION

Although clearly related in terms of the morphology of *Floraconus baeri baeri* (Röckel & Korn, 1992) (Plate 4, Figures 3-4), this subspecies is smaller, from further south, does not have the strong orange-brown banding of *baeri baeri*, no spiral grooves on the upper part of the whorl, and a virtual absence of the distinctive deep brown dashes or ‘bars’ that cover the entire whorl of *baeri baeri*. The holotype of *F. baeri baeri* is illustrated in Monnier, Limpalaër, Robin & Roux, 2018, A Taxonomic Iconography of Living Conidae, Volume 1, page 489 figure 2.

ACKNOWLEDGEMENTS

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Cite as: Seccombe, A. and R. Aiken. 2022. Two new Conidae subspecies, *Nataliconus immelmani alanfraseri* and *Floraconus baeri desuntnotae* from the Eastern area of South Africa are described. The Festivus 54(1):36-43. http://doi.org/10.54173/F54136

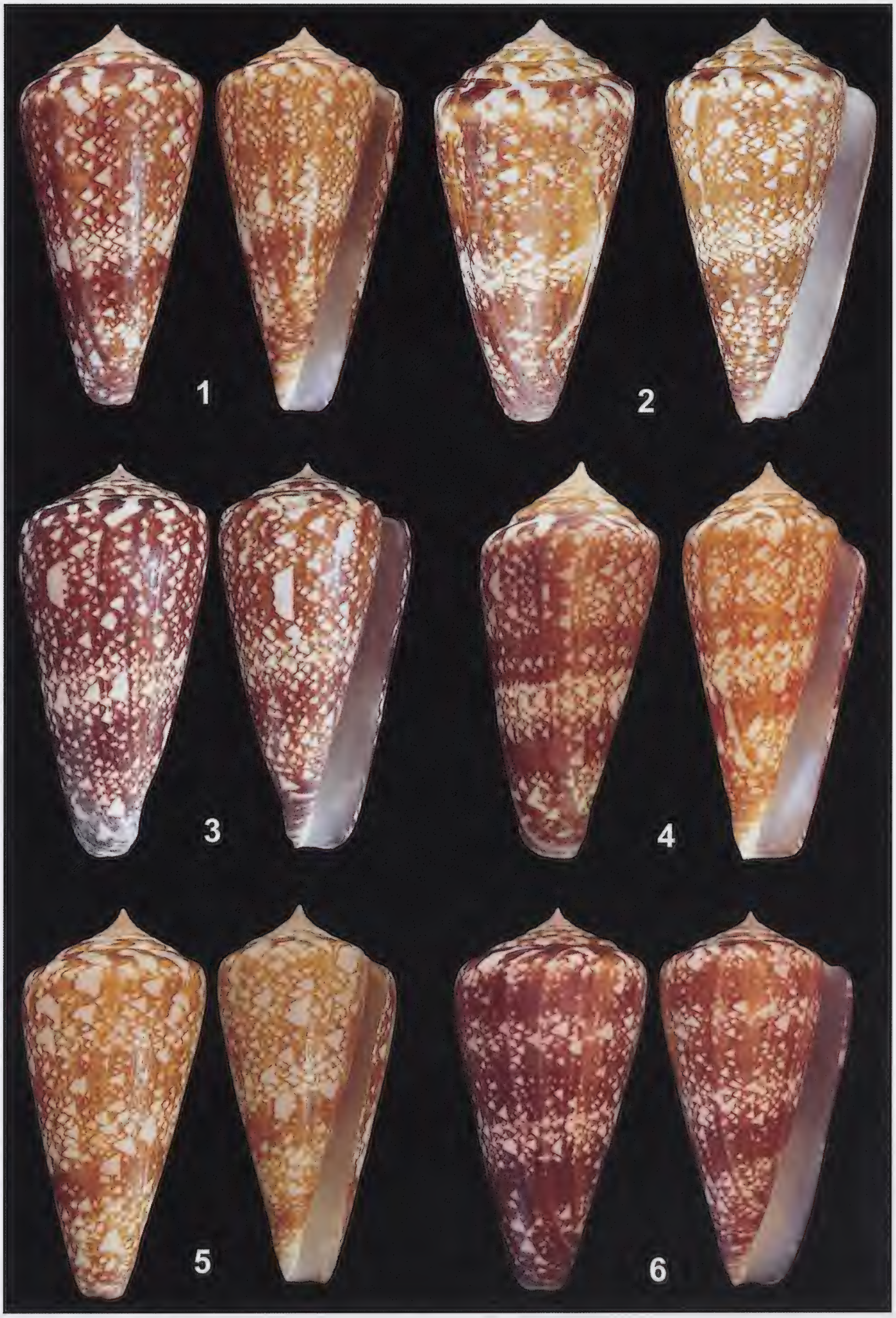

Plate 1. **1=** *Nataliconus immelmani alanfraseri* (72.0 mm) – Holotype 1, off southern KwaZulu-Natal, dredged 70-110 m, Coll: A. Seccombe; **2=** Nataliconus *immelmani alanfraseri* (100.2 mm) – Paratype 11, off southern KwaZulu-Natal, dredged 70-110 m, Coll: R. Aiken; **3=** Nataliconus *immelmani alanfraseri* (99.0 mm) – Paratype 3, off southern KwaZulu-Natal, dredged 70-110 m, Coll: A. Seccombe; **4=** Nataliconus *immelmani alanfraseri* (71.9 mm) – Paratype 4, off southern KwaZulu-Natal, dredged 70-110 m, Coll: A. Seccombe; **5=** *Nataliconus immelmani alanfraseri* (66.8 mm) – Paratype 5, off southern KwaZulu-Natal, dredged 70-110 m, Coll: A. Seccombe; **6=** *Nataliconus immelmani* alanfraseri (86.9 mm) – Paratype 10, off southern KwaZulu-Natal, dredged 70-110 m, Coll: A. Seccombe.

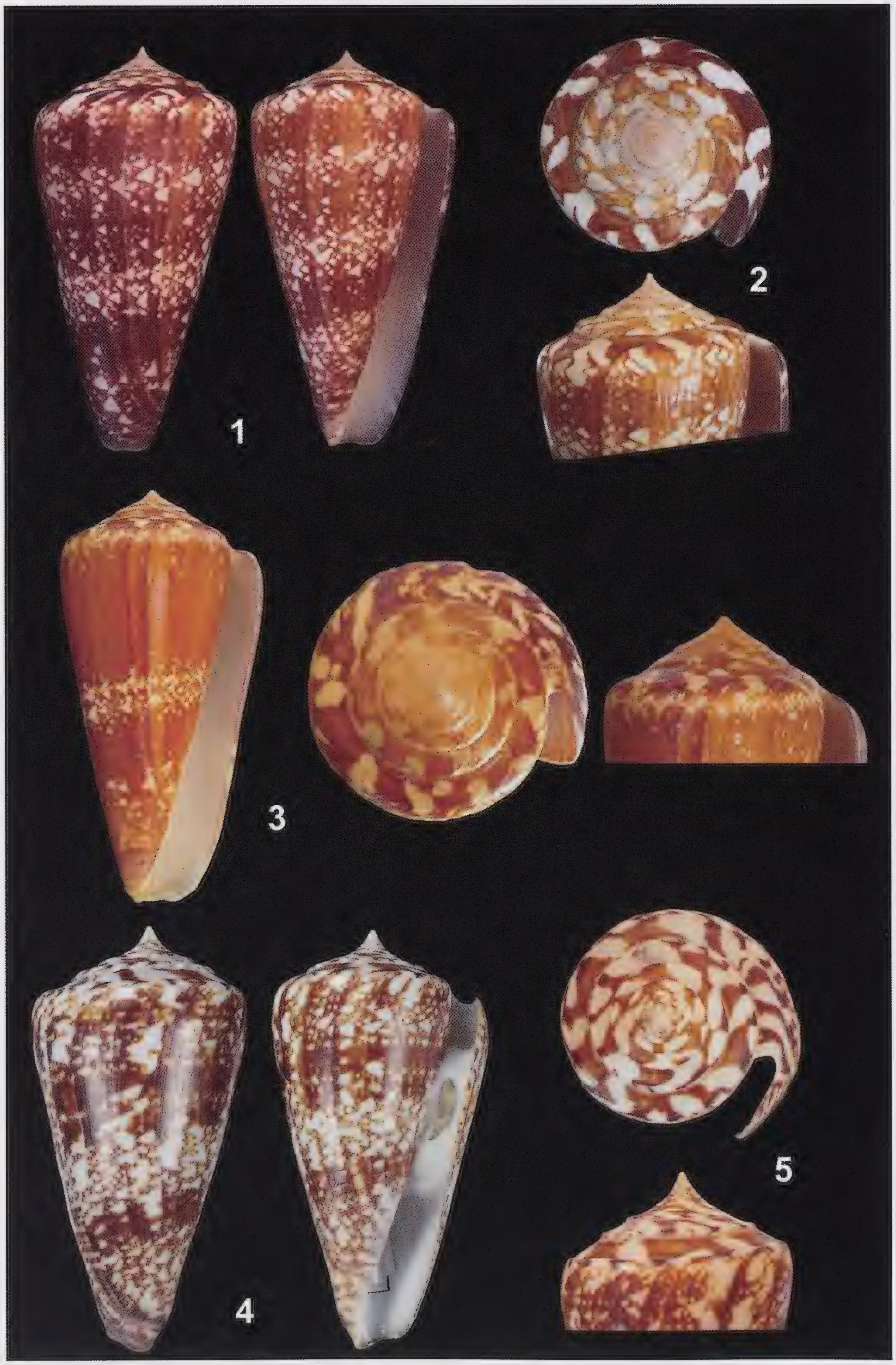

Plate 2. **1-2=** *Nataliconus immelmani alanfraseri* (71.0 mm) – Paratype 6; off southern KwaZulu-Natal, dredged 70-110 m. Coll: A. Seccombe; **3=** *Nataliconus immelmani immelmani* (90.0 mm), Deep water, off southern KwaZulu-Natal. Coll: R. Aiken; **4-5=** *Leptoconus amadis* (88.1 mm), Kottai Pattinam, India. Coll: A. Seccombe.

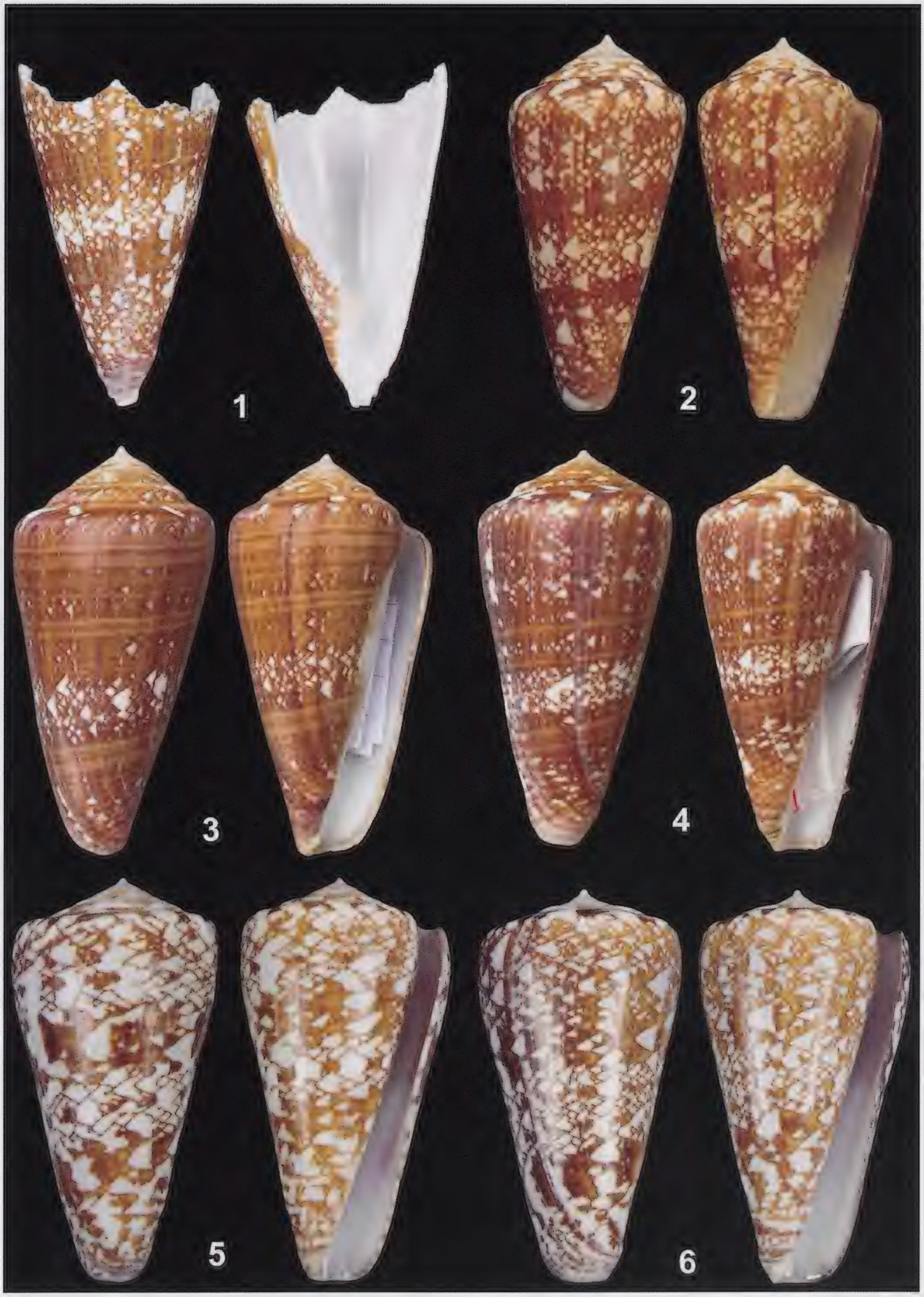

Plate 3. **1**= *Nataliconus immelmani alanfraseri* (approx. 93.0 mm) – Paratype 12, off southern KwaZulu-Natal, Musselcracker victim, Coll: R. Aiken; **2**= Nataliconus *immelmani alanfraseri* (96.5 mm) – Paratype 9, off southern KwaZulu-Natal, dredged 70-110 m, Coll: A. Seccombe; **3**= *Nataliconus immelmani immelmani* (84.0 mm), Deep water, southern KwaZulu-Natal, Coll: A. Seccombe; **4**= *Nataliconus immelmani immelmani* (79.5 mm), Deep water, southern KwaZulu-Natal, Coll: A. Seccombe; **5**= *Nataliconus royaikeni* (62.1 mm), Scuba 40 m, off southern KwaZulu-Natal, Coll: R. Aiken; **6**= *Nataliconus Nataliconus royaikeni* (60.5 mm), Scuba 40 m, off southern KwaZulu-Natal, Coll: R. Aiken.

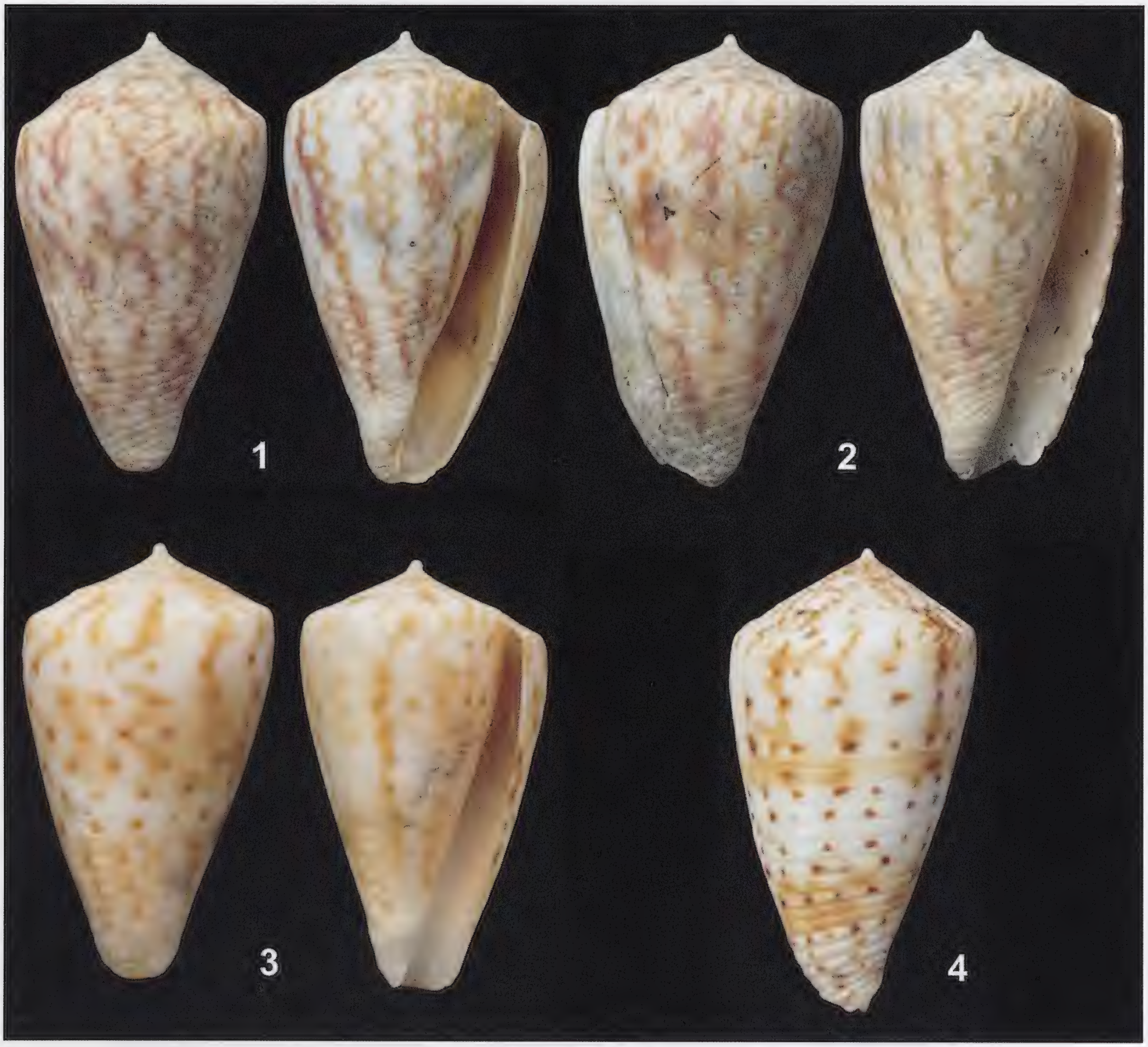

Plate 4. **1**= *Floraconus baeri desuntnotae* (35.0 x 20.0 mm) – Paratype 1, off Richards Bay, KwaZulu-Natal, Coll: A. Seccombe; **2**= *Floraconus baeri desuntnotae* (32.5 x 19.0 mm) – Holotype, off Richards Bay, KwaZulu-Natal, Coll: R. Aiken; **3**= *Floraconus baeri baeri* (44.9 x 24.0 mm), Coll: R. Aiken; **4**= *Floraconus baeri baeri* (43.0 x 23.9 mm), Coll: A. Seccombe.

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A new subspecies of *Cinctura* (Gastropoda: Fasciolariidae) from the Ten Thousand Islands, Florida

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ABSTRACT A new geographical bathymetric subspecies of the offshore deepwater species *Cinctura tortugana* (Hollister, 1957) is described from shallow subtidal depths off southwestern Florida. The new subspecies, *Cinctura tortugana foxi*, is described from offshore of the Ten Thousand Islands, in Collier and Monroe Counties, Florida.

KEY WORDS Fasciolariidae, *Cinctura*, *Hollisteria*, *Cinctura tortugana foxi* n. subsp., Carolinian Molluscan Province, Gulf of Mexico

INTRODUCTION

The fasciolariid genus *Cinctura* Hollister, 1957, which is endemic to the Carolinian Molluscan Province, is now known to contain five distinct species and four subspecies: *C. hunteria* (Perry, 1811), *C. keatonorum* Petuch, 2014, *C. lilium* (Fischer von Waldheim, 1807), *C. tortugana tortugana* (Hollister, 1957), *C.* (*Hollisteria*) *branhamae* (Rehder & Abbott, 1951), *C. hunteria apalachee* Petuch & Berschauer, 2020, *C. lilium connori* Petuch & Berschauer, 2020, *C. tortugana traciae* Petuch & Berschauer, 2020, and *C.* (*Hollisteria*) *branhamae morganae* Petuch & Berschauer, 2020.

Although the genus *Cinctura* ranges from Cape Hatteras, North Carolina to Isla Contoy, Yucatan Peninsula, Mexico, the majority of the known taxa are restricted to the Gulf of Mexico. Of these, only two, *Cinctura hunteria* and its subspecies *C. hunteria apalachee*, were previously known from shallow water and intertidal depths (Petuch & Berschauer, 2020). All the other taxa live in deeper water, offshore areas (in 20-400 m depths), and are primarily collected by the dredging operations of commercial shrimp and scallop fishermen or from deep water lobster and crab traps.

Cinctura tortugana tortugana lives on carbonate rubble sea floors on the West Florida Shelf and along the edge of the bathyal zone, in depths of 50 to 200 m. In the deeper areas along the edge of the Florida Escarpment, *C. tortugana* is associated with sea floors that are dominated by the red coralline algae *Porolithon* and *Goniolithon*, which form thick and densely-intertwined beds composed of algal nodules (rhodoliths). Here, it occurs along with other distinctive rhodolith-associated mollusks such as the muricid *Chicoreus rachelcarsonae* Petuch, 1987, the cone shell *Dauciconus aureonimbosus* (Petuch, 1987), the busyconid *Lindafulgur lyonsi* (Petuch, 1987), and the scallop *Lindapecten lindae* Petuch, 1995.

Cinctura tortugana traciae is an isolated deep water eastern Yucatan subspecies, which lives in deep water areas along the lower neritic and

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upper bathyal zones, ranging from 200 to 300 m depths. This deep neritic-upper bathyal bathymetric preference differs dramatically from that of the nominate subspecies, *C. tortugana tortugana*, which prefers shallower depths of 50 to 200 m in the lower neritic zone.

A new geographical subspecies *Cinctura tortugana foxi* n. subsp. is described from shallow water off the Ten Thousand Islands, Collier County, Florida. The holotype of this new subspecies is deposited in the type collection of the Department of Malacology, Los Angeles County Museum of Natural History ("LACM"), Los Angeles, California.

SYSTEMATICS

Class Gastropoda
Subclass Sorbeoconcha
Order Prosobranchia
Infraorder Neogastropoda
Superfamily Buccinoidea
Family Fasciolariidae
Subfamily Fasciolariinae
Genus *Cinctura* Hollister, 1957

Cinctura tortugana foxi Petuch and Berschauer, new subspecies

(Plate 1 Figures A-E)

Description. Shell of average size for genus, 70-87 mm, same as nominate subspecies, thickened and heavy, elongated and fusiform, with rounded whorls and distinctly sloping subsutural area; body whorl moderately inflated, with rounded sides; spire elevated and protracted, almost same length as body whorl; anterior end of columellar area ornamented with two large, prominent rib-like folds, with posteriormost fold being largest and best-developed; posterior end of columellar area with single large cord that extends beyond edge of lip; dark orange on the parietal callus; shell base color dark cream-white overlaid with very numerous, densely-packed dark reddish-brown longitudinal flammules, which are best-developed along subsutural area, around shell mid-body, and on siphonal canal; red-brown and cream base color overlaid with 5-6 thin, evenly-spaced thin dark blackish brown bands, with many specimens having thinner secondary bands between the prominent main bands; some specimens have as many as 12 distinct bands; siphonal canal proportionally short, dark brown or blackish-brown in color, ornamented with 8-9 very strong, prominent spiral cords; anteriormost tip of dark brown siphonal canal colored deep orange-tan; protoconch and early whorls pale orange in color; early whorls proportionally narrow, ornamented with 4-5 very shallow spiral grooves and poorly-developed undulating ribs; aperture oval in shape with white interior; columellar area with large orange patches.

Type Material. HOLOTYPE - Length 79 mm, width 47 mm, Kice Island, Ten Thousand Islands, Florida, LACM 3782; OTHER MATERIAL EXAMINED - length 87 mm, same locality as the holotype, in the research collection of the senior author; length 81 mm, from Camp Lulu Key, Ten Thousand Islands, in the research collection of the junior author; length 71 mm, from the same locality as the holotype, in the collection of the junior author; specimen; length 77 mm, from the same locality as the holotype, in the Dave W. Fox collection.

Type Locality. Collected on the beach after a storm, Kice Island, Ten Thousand Islands, Collier County, Florida.

Etymology. Named for Dave W. Fox, of Fort Myers, Florida, who collected the type lot of the new subspecies on Kice Island.

Discussion. This new subspecies of the Tortugas Tulip Shell has only been collected on beaches along the Ten Thousand Islands and constitutes a distinct shallow water subspecies endemic to the Chokoloskean Infraprovince of the Suwannean Subprovince of the Carolinian Molluscan Province. The other two taxa in the *Cinctura tortugana* complex, including the nominate Florida subspecies *C. tortugana tortugana* (Hollister, 1957) (Figures E, F) and the eastern Yucatan subspecies *C. tortugana traciae* Petuch & Berschauer, 2020) (Figures G, H), are both deep water shells, occurring along the edge of the continental shelf (Outer Neritic Zone) and upper continental slope (Bathyal Zone). (See map at Figure 1) The nominate subspecies was described from the Tortugas Shrimping Ground northwest of the Dry Tortugas Islands, where it is found in depths of 60-150 m depths. There, it lives on red coralline algal sea floors (*Porolithon* and *Goniolithon*). The Yucatan subspecies, *traciae*, occurs in much deeper water, ranging between 200-300 m depths and has only been collected by deep water shrimp (*Glyphocrangon*) boats working along the western side of the Yucatan Channel. The new subspecies, *foxi*, can now be seen to be the only shallow water member of this normally-offshore group. Based on the assemblage of mollusks that is usually associated with *foxi* in beach drift, including the volute, *Scaphella junonia*, the murex, *Vokesimurex cabritii*, and the scallop, *Euvola raveneli*, the new Ten Thousand Islands subspecies is presumed to live in shallow subtidal depths, averaging 10-25 m, and based on the offshore habitat it is presumed to prefer muddy-sand sea floors.

Cinctura tortugana foxi differs from the nominate subspecies in having a more slender shell with less-inflated whorls and straighter sides. The colors of the two subspecies differ greatly, with the nominate subspecies being marked with color patches of bright orange, yellow-orange, or vivid orange-red and a white parietal callus, while *foxi* typically exhibits only amorphous patches of deep reddish-brown, a dark orange parietal callus, and with little variability in color. The early whorls of the new subspecies are also proportionally narrower than those of the nominate subspecies, being more slender and in having less-inflated whorls. The postnuclear whorls of the nominate subspecies are sculptured with 5-6 deeply incised spiral sulci and 8-10 low, rounded knobs while those of the subspecies *foxi* are much smoother, being only slightly ornamented with faint spiral grooves and a few nearly-obsolete, low knobs. See Petuch & Berschauer, 2020 for a detailed overview of the *Cinctura tortugana* - *Cinctura lilum* species complexes.

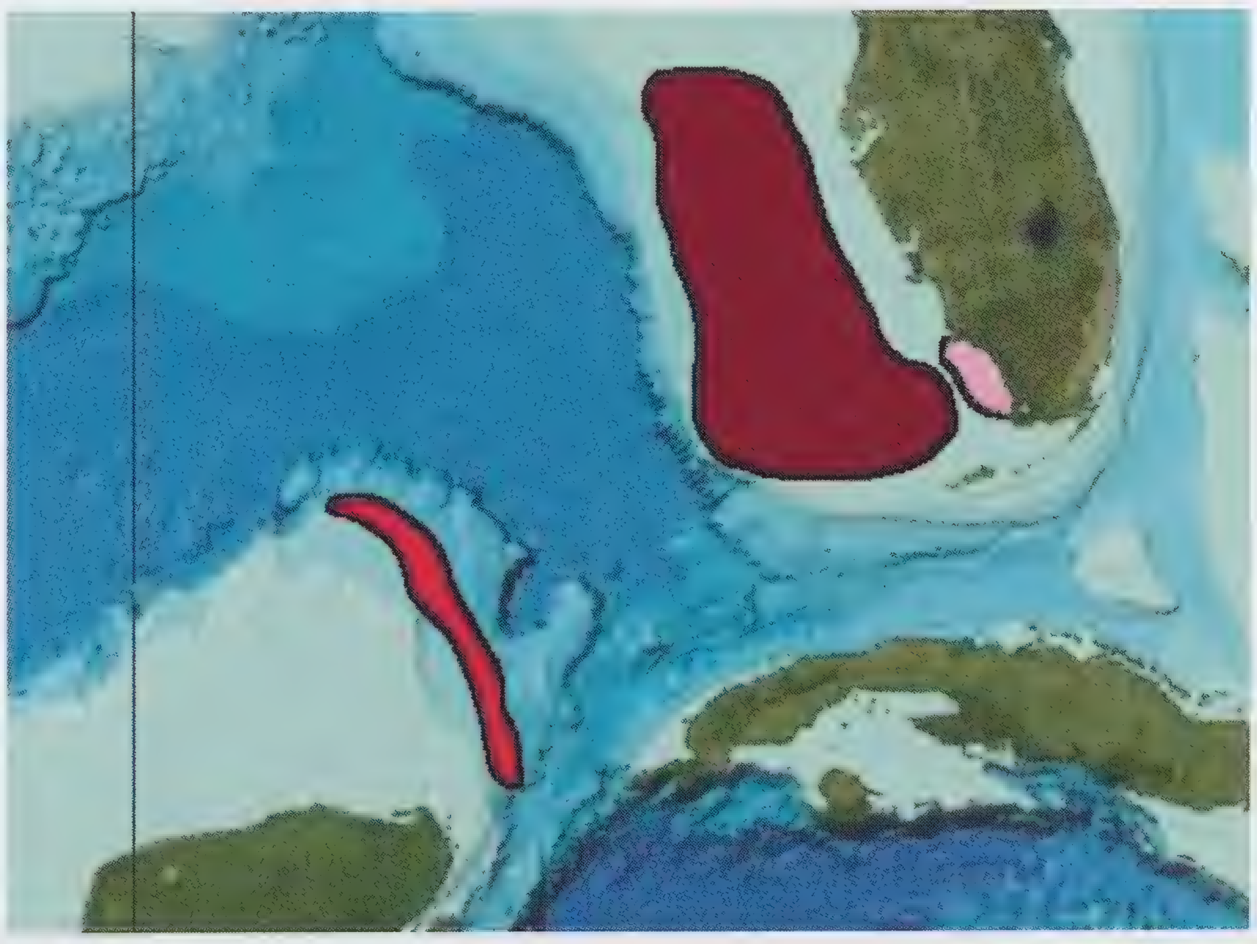

Figure 1. Map Yucatan Peninsula, Mexico and southeastern Florida, United States, showing the presumed ranges of *Cinctura tortugana* species and subspecies based upon benthometric data. Burgundy= *Cinctura tortugana*; Red= *Cinctura tortugana tracieae;* and Pink= *Cinctura tortugana foxi* n. subsp.

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We thank the following for their help in acquiring specimens of the Banded Tulips used in this paper, for their generous donation of study specimens, and for their help in field collecting. A. Kenneth ("Kenny") Brown, Jr., Chokoloskee, Florida; Capt. Craig Daniels,

Chokoloskee, Florida; and, Dave W. Fox, of Fort Myers, Florida, who collected the type lot of the new subspecies on Kice Island. We also thank the anonymous reviewers for their diligence and efforts in reviewing this paper.

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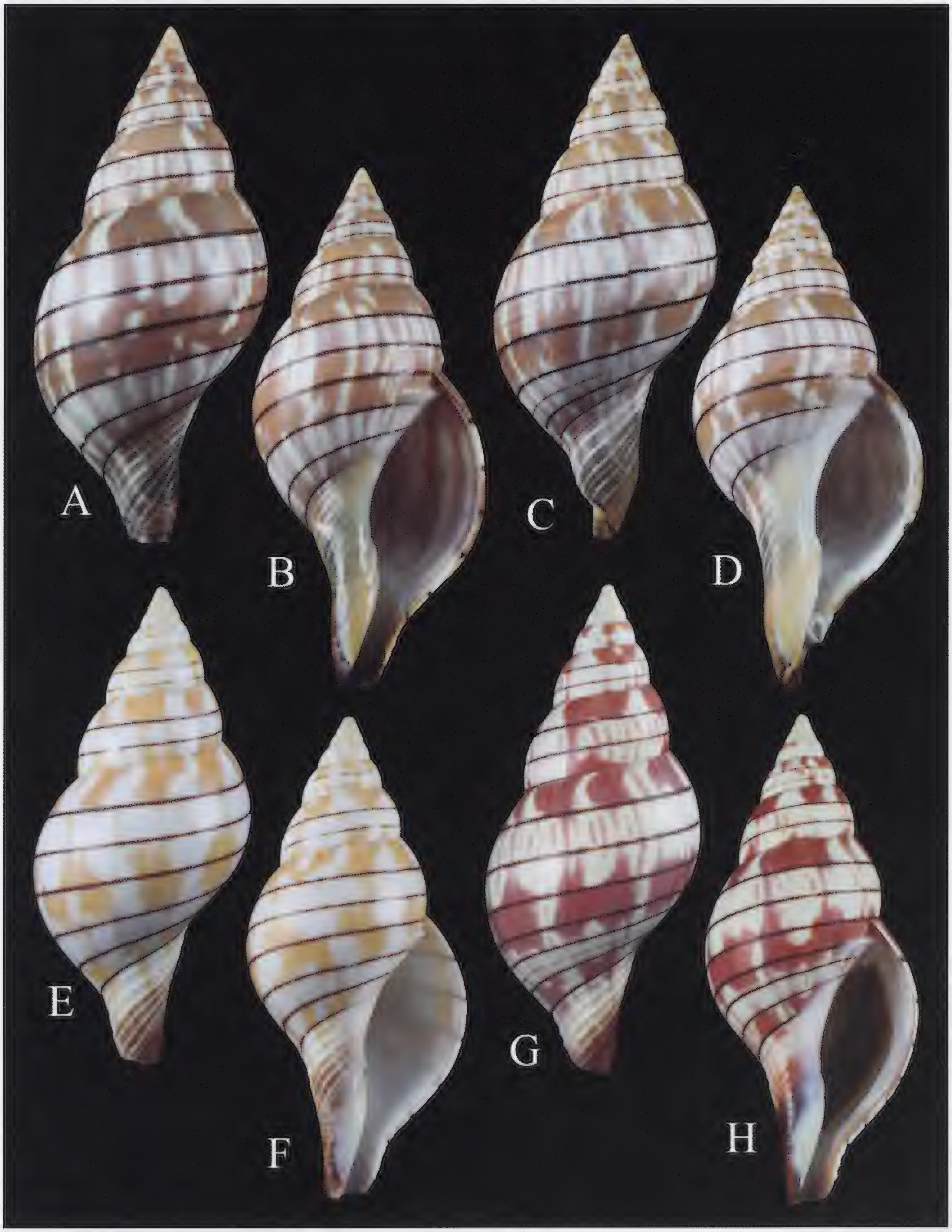

Plate 1. *Cinctura tortugana* species complex.
A, B= *Cinctura tortugana foxi* Petuch & Berschauer, n. subp., holotype, length 79 mm, LACM 3782, Kice Island, Ten Thousand Islands, Florida; **C, D**= *C. tortugana foxi*, typical specimen, length 87 mm, in the research collection of Edward Petuch; **E, F**= *Cinctura tortugana* (Hollister, 1957), length 74 mm, from 60 m depth north of the Dry Tortugas, Florida Keys, Monroe County, Florida, in the research collection of Edward Petuch; **G, H**= *Cinctura tortugana traciae* Petuch & Berschauer, 2020, holotype length 72.3 mm, LACM 3805, trawled from 250 m depth off Cabo Catoche, Quintana Roo State, Mexico.

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Two New Species of *Amphidromus* (Mollusca: Gastropoda: Camaenidae) from Indonesia and Vietnam

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ABSTRACT Two new species of the land snails in the genus *Amphidromus* Albers, 1850 are described: *Amphidromus gisellelieae* n. sp. from Indonesia, and *Amphidromus phamvutuanhae* n. sp. from Vietnam. They are compared to the closest congeners in this genus.

KEYWORDS Gastropoda, Helicoidea, Camaenidae, *Amphidromus*, *Amphidromus gisellelieae, Amphidromus phamvutuanhae*, Buton, Indonesia, Gia Lai, Vietnam

INTRODUCTION

Amphidromus is a prominent genus of land snails in the family Camaenidae. The genus is found in eastern India, southeast to Australia and north to Taiwan. These colorful snails are moderate to large in size ranging from 17.5 mm to 75.0 mm.

Two new *Amphidromus* species, one from Indonesia and another from Vietnam, have been identified by N.N. Thach, S. Lie and P. Ahn.

Abbreviations

JA = John Abbas collection
NNT = Nguyen Ngoc Thach collection
PA = Pham Anh collection
SL = Steven Lie collection
n. sp. = new species
AH = Aperture Height
SH = Shell Height
SW = Shell Width

SYSTEMATICS

Class Gastropoda Cuvier, 1797
Subclass Heterobranchia
Order Stylommatophora
Superfamily Helicoidea
Family Camaenidae Pilsbry, 1895
Genus *Amphidromus* Albers, 1850
Type species: *Helix perversus* Linnaeus, 1758
(subsequent designation)

Amphidromus gisellelieae Thach & Abbas, new species (Figures 1-9, & 12)

Description. Shell height between 35.1-37.8 mm (of collected specimens), elongate-tapering and sinistral. Shell width 44% of height (Table 1). Spire broad and moderately tall, sutures deep. Body whorl inflated and occupying 71% of shell height, periphery rounded. Outer surface ornamented with widely-spaced and irregularly-shaped axial stripes. Sculpture with oblique axial riblets. Aperture subquadrate with external pattern visible within and occupying 47.7% of shell height, outer lip moderately thick and slightly reflected. Columella straight, slightly elevated and parallel to shell axis, umbilicus open. Color yellowish with brown axial stripes.

No.	1	2	3
SH (mm)	35.1	37.8	35.5
SW (mm)	15.2	16.1	16.5
SW/SH	0.43	0.43	0.46
Mean SW/SH	**0.440**		
BH (mm)	24.8	26.5	25.5
BH/SH	0.71	0.70	0.72
Mean BH/SH	**0.710**		
AH (mm)	16.0	17.4	18.0
AH/SH	0.46	0.46	0.51
Mean AH/SH	**0.477**		

Table 1. *Amphidromus gisellelieae*

Type material. Holotype (35.1 mm high x 15.2 mm wide) deposited in the Paris Museum of Natural History with Registration No: MNHN-IM-2000-29957.

Other material. Paratype 1 (37.8 mm high) in JA collection, Paratype 2 (35.5 mm high) in SL collection. All types from type locality.

Type locality. Baubau area, Buton Island, Indonesia.

Habitat. Tree dweller.

Etymology. The new species is named after Giselle Natalie from Indonesia for her interest at land snails.

Discussion/Diagnosis. The new species resembles *Amphidromus glaucolarynx* (Dohrn, 1861) (Figure 10) in that the columella is parallel to shell axis and the presence of widely-spaced axial stripes, but differs mainly in different aperture shape, lack of subsutural bands and black spiral bands at early whorls, different shape of axial stripes, spire not slender and less pointed, parietal wall not wavy and not ornamented with black band, no black line along inner margin of outer lip and background color. *Amphidromus sinistralis* (Reeve, 1849) (Figure 11) resembles the new species in presence of widely-spaced axial stripes, but is distinguished mainly by rounded and darker aperture, more constricted sutures, presence of subsutural bands, columella is not straight, presence of conspicuous line along inner margin of outer lip and much broader parietal wall.

Amphidromus phamvutuanhae Thach, new species
(Figures 13-20)

Description. Shell height between 31.4-37.5 mm (of collected specimens, elongate-tapering and dextral. Shell width 51% of height (Table 2). Spire broad, moderately tall and straight-sided, sutures adpressed. Body whorl inflated and occupying 71% of shell height, periphery rounded. Outer surface ornamented with many broad axial stripes that are bisected and irregularly-spaced and sometimes crossed by spiral bands, giving rise to many blotches at spire whorls. Sculpture with oblique, closely-spaced axial ribs and dark green subsutural bands. Aperture elongate with rounded extremity, occupying 55.3% of shell height, outer lip thick, rounded and reflected. Columella distorted, wavy and nearly parallel to shell axis, umbilicus closed. Color yellowish-green with green axial stripes, dark purple columella and purplish outer lip.

No.	1	2	3
SH (mm)	37.5	36.9	31.4
SW (mm)	19.5	18.0	16.6
SW/SH	0.52	0.48	0.53
Mean SW/SH	**0.510**		
BH (mm)	26.5	25.9	22.7
BH/SH	0.71	0.70	0.72
Mean BH/SH	**0.710**		
AH (mm)	21.0	20.6	17.0
AH/SH	0.56	0.56	0.54
Mean AH/SH	**0.553**		

Table 2. *Amphidromus phamvutuanhae*

Type material. Holotype (37.5 mm high x 19.5 mm wide) deposited in the Paris Museum of Natural History with Registration No: MNHN-IM-2000-29958.

Other material. Paratype 1 (36.9 mm high) in NNT collection, Paratype 2 (31.4 mm high) in PA collection. All types from type locality.

Type locality. Kbang District, Gia Lai Province, Central Vietnam.

Habitat. Around trees, among leaf litter.

Etymology. The new species is named after Pham Vũ Tú Anh from Vietnam to encourage her continued study of malacology.

Discussion/Diagnosis. The new species resembles *Amphidromus dungae* Thach, 2021 (Figures 21, 22) in shell shape but differs mainly in a narrower and more pointed aperture, columella and outer lip are not pink of curved, broader but not slender body whorl, lack of pink dots on subsutural bands and havinf differently shaped axial stripes. *Amphidromus marki* Thach, 2021 (Figures 23, 24) is distinguished mainly from the new species by a much shorter spire, more swollen body whorl, black columella and outer lip, much wider aperture, columella that is not straight and oriented to opposite direction.

Satsuma backeljaui Thach & F. Huber, 2021

This species was described in Thach (2021), pages 98-99, Pl. 75, No. 773*-774* and the holotype is deposited at the Royal Belgian Institute of Natural Sciences with Registration No: RBINS, I.G. 34432/ MT.3915. The allocated general inventory number is I.G. 34432 and the allocated register number is MT.3915.

ACKNOWLEDGMENTS

The author thanks John Abbas his coauthor of *A. gisellelieae*, and the anonymous reviewers for their work on this article. Thanks are also due to the Library of University of California for access to the book by Pilsbry (1900), to Steven Lie from Indonesia and Pham Anh from Vietnam for providing the type material.

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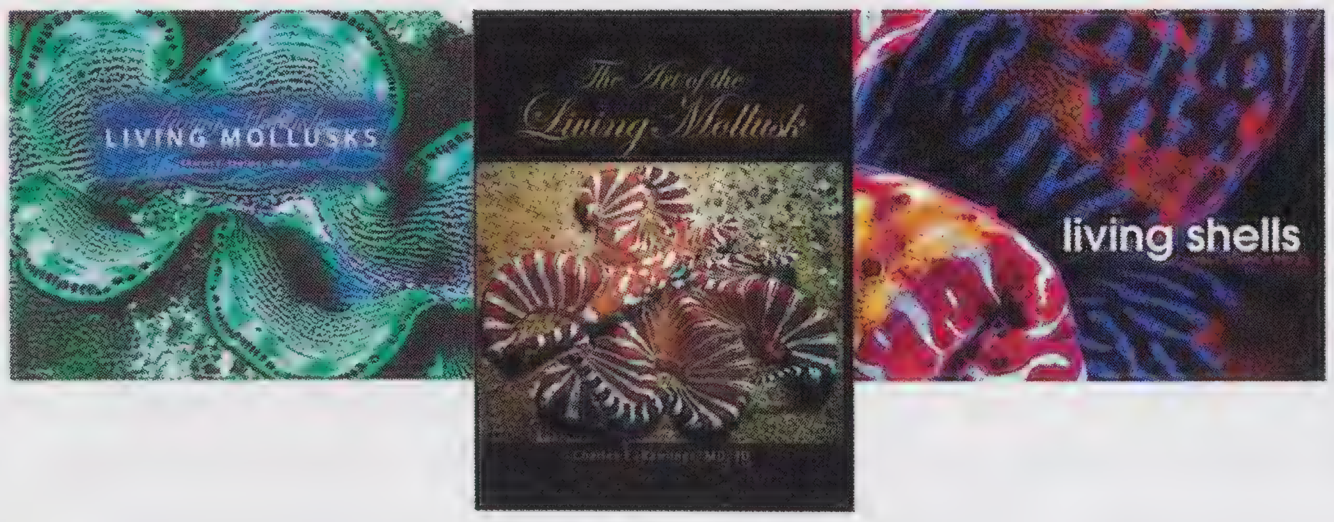

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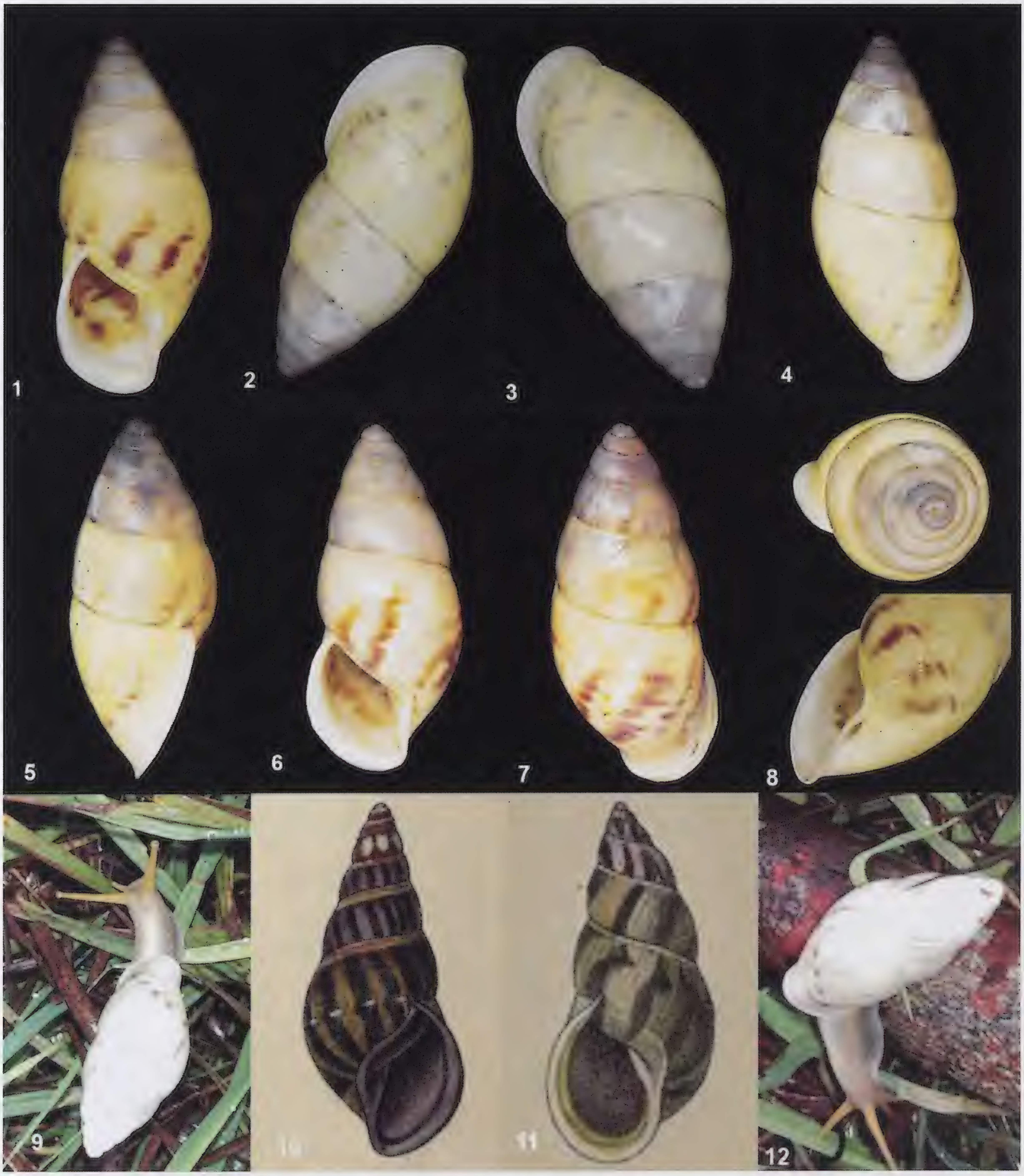
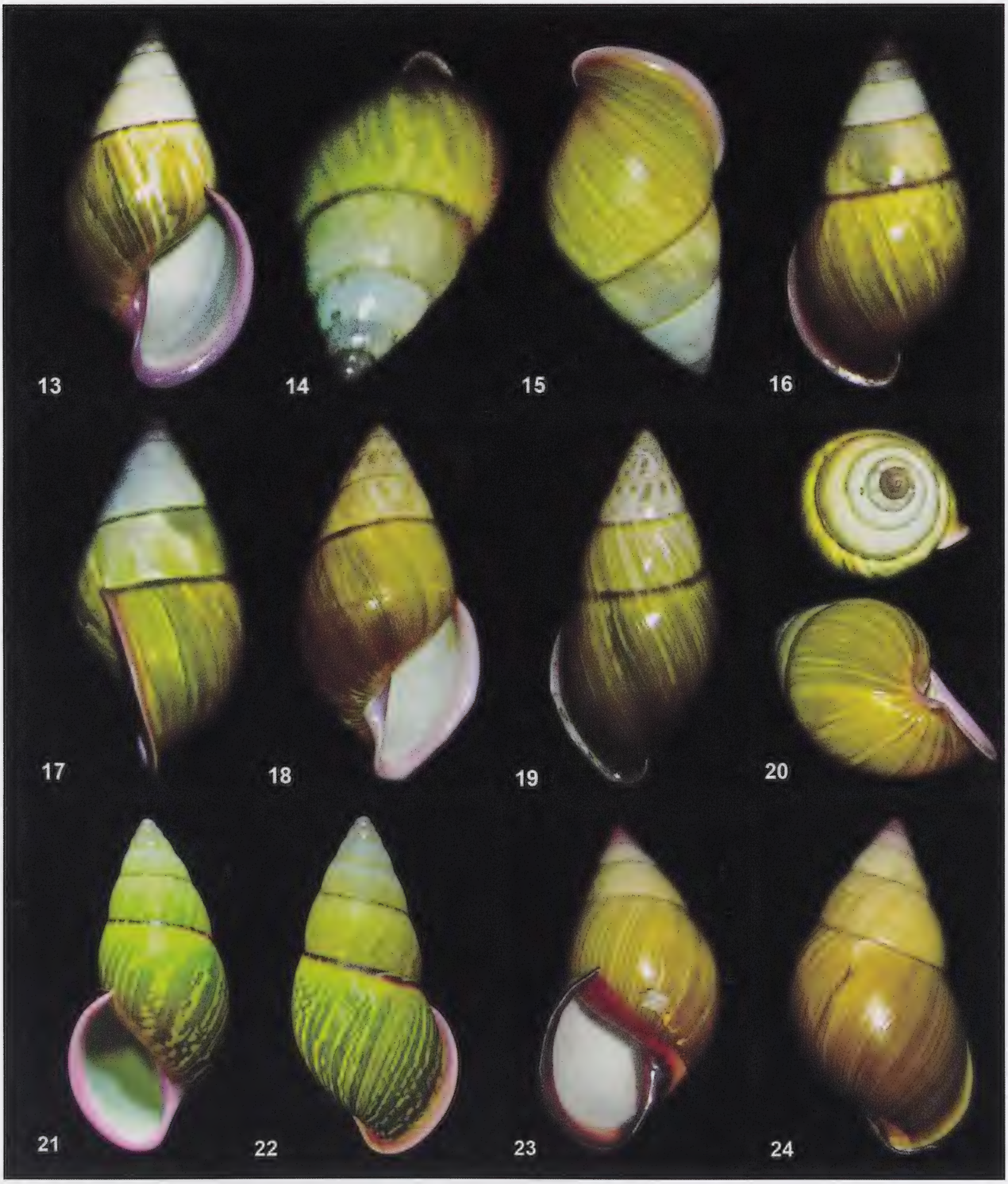


Figures 1-9 and 12. ***Amphidromus gisellelieae*** Thach & Abbas n. sp., Indonesia; **1-2**= holotype 35.1 mm high with apertural and reflected outer lip views; **3-4**= holotype with spire and dorsal views, **5**= holotype with lateral view; **6-7**= paratype 1, 37.8 mm high with apertural and dorsal views; **8**= Enlarged apex (top) and umbilicus (bottom) of holotype; **9, 12**= photo of live molluscs; **Figure 10.** ***Amphidromus glaucolarynx*** (Dohrn, 1861) for comparison, original fig. 49, Plate 60 in Pilsbry (1900); **Figure 11.** ***Amphidromus sinistralis*** (Reeve, 1849) for comparison, original fig. 23, Plate 68 in Pilsbry (1900).



Figures 13-20: ***Amphidromus phamvutuanhae*** Thach n. sp., Vietnam; **13-14=** holotype 37.5 mm high with apertural and reflected outer lip views; **15-16=** holotype with spire and dorsal views, **17=** holotype with lateral view; **18-19=** Paratype 1, 36.9 mm high with apertural and dorsal views; **20=** Enlarged apex (top) and umbilicus (bottom) of holotype; **Figures 21, 22.** ***Amphidromus dungae*** Thach, 2021, for comparison; **Figures 23, 24.** ***Amphidromus marki*** Thach, 2021, for comparison.

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Have a shell collection you would like to donate to The San Diego Shell Club?

The San Diego Shell Club is interested in your shell collection. As a 501c(3) organization, all donations to our Club may provide a tax write-off. When we receive a donation we provide a letter describing the items that may be used when filing your taxes. While we cannot provide a value, donations of up to $5,000 do not require a written appraisal. Since tax laws change regularly we recommend that you check with your tax accountant before relying on any information provided here.

We are interested in all types of shells, marine or land and all genera and species, including books on shells as well as items related to shells such as artwork, storage cases and tools. Your donated items will be used to generate income to support the Club's efforts in continuing Public education about shells and conservation of marine life throughout the world. If you would like to donate, please contact David Waller, SDSC Acquisition Chairperson, by email at dwaller@dbwipmg.com to schedule a time to discuss charitable gifting.

CLUB NEWS

2021 - November Auction
The November Auction at the home of Larry and Debbie Catarius was a big success with beautiful shells from several quality collections available for the spirited bidders. Also, many high-quality books were available and found new homes.

2021 December - Holiday Party and General Meeting
The December Christmas Party was canceled through an abundance of caution due to Covid-related health concerns. The general meeting was also canceled due to Covid-19 concerns and restrictions.

2022 January - General Meeting
Canceled due to Covid-19 concerns and restrictions.

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President's Message

Dear Members,

I am pleased and honored to be elected your President for 2022 and would like to thank you for your support. I would also like to congratulate the other elected members, David Berschauer (Vice President), Leo Kempczenski (Recording Secretary), Duffy Daughenbaugh (Treasurer), Robyn Waayer (Corresponding Secretary, Webmaster), Paul Tuskes (Member-at-Large), Roger Clark (Member-at-Large) and Rick Negus (Member-at-Large). It has been a long 2 years and the effect of the pandemic will likely influence how we conduct ourselves as a Club into the future. It is my hope that we will be able to hold our normally scheduled annual events as well as our monthly general meetings "in-person". The dates and times of this year's events will have to be tentative because of the ongoing pandemic. Consequently, please check the Club's website to assure that a particular meeting or event has not been rescheduled or canceled before leaving the house.

As we begin this New Year, I will be focusing my efforts in three key areas: organizing the SDSC's storage area; increasing our Club's financial resources; and elevating the quality and content of our Club's journal. These are ambitious goals and I congratulate the past Board for laying the groundwork over the past year to assure that we will be able to reach our objectives. Currently, the Club utilizes an about 150 square feet of space to store its belongings (*e.g.,* shells, books, mugs, pins, historical documents and event materials) and an additional 20 sq. feet of space in the San Diego Botanic Garden Foundation Building to house the Club's audio/visual equipment and library. All of these items have been packed into these locations with minimal organization, making it almost impossible to find items when needed. My goal will be to reorganize these areas and eliminate items the Club no longer needs or uses making the remaining items easy to locate and access.

Next, the restrictions on public gatherings during the pandemic prevented the Club from conducting two annual auctions, two West Coast Shell Shows and many in-person General Meetings, all of which are revenue generators for our Club with the overall effect of reducing our reserves. On the bright side, the pandemic increased the number of donations our Club received; replenishing our supply of shells for auctions. It is my hope to hold in-person meetings, conduct our April and November auctions, as well as host the West Coast Shell Show in 2022 and rebuild our reserves to pre-pandemic levels.

Finally, the past Board of Director's have taken steps to elevate our Club's publication, *The Festivus*, by instituting an "impact factor" rating. World class journals use the impact factor to gauge their journal's popularity and increase manuscript submission for publication with the end result of increased readership. It is my hope to increase the popularity of *The Festivus*, our readership and our membership by gradually increasing our impact factor rating through 2022.

I wish all of our members a safe and prosperous New Year.

David B. Waller

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Pitcairn and Henderson Islands Trip

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Note: This article is an adaptation from the article published in Beautiful Cowries Magazine in 2015 (7:33-44) on a trip taken by the author in 2008.

It is a long way to travel, a long time at sea to visit Pitcairn and Henderson Islands - west of Easter Island, Southeast of French Polynesia and east of New Zealand. Is it worth the effort? Seizing the opportunity to find out and fulfill a long-held dream, Don Pisor and I booked ourselves on a 12-day trip aboard the research vessel Bounty Bay to both islands.

The two islands, part of the Pitcairn Group, which also includes the Oeno and Ducie Atolls as well as a large seamount, reported to be approximately 40 miles ESE of Pitcairn, are administered by Great Britain and are as isolated as any island can be. They are also a study in contrasts.

Pitcairn is a small volcanic island, irregular and somewhat oval in shape with a land mass of approximately 1.75 miles. There are no landing beaches and the island has no fringing or barrier reefs to protect it from the almost constant pounding from ocean swells (See Figure 1A). A small landing slip has been constructed at Bounty Bay (see star on map), approximately 50 meters from the final resting place of HMS Bounty, and it is from this slip that the Long Boats go out to meet passing ships to unload cargo and passengers. There are about 50 residents, most of whom are descended from the original mutineers and the Tahitians who accompanied them (see "The Bounty" movie poster in Figure 4B about mutiny on the Bounty starring Mel Gibson and Sir Anthony Hopkins). There are no tourist facilities and written permission from the government is required to visit the island. So, those wishing to stay on the island must arrange to stay with one of the local families.

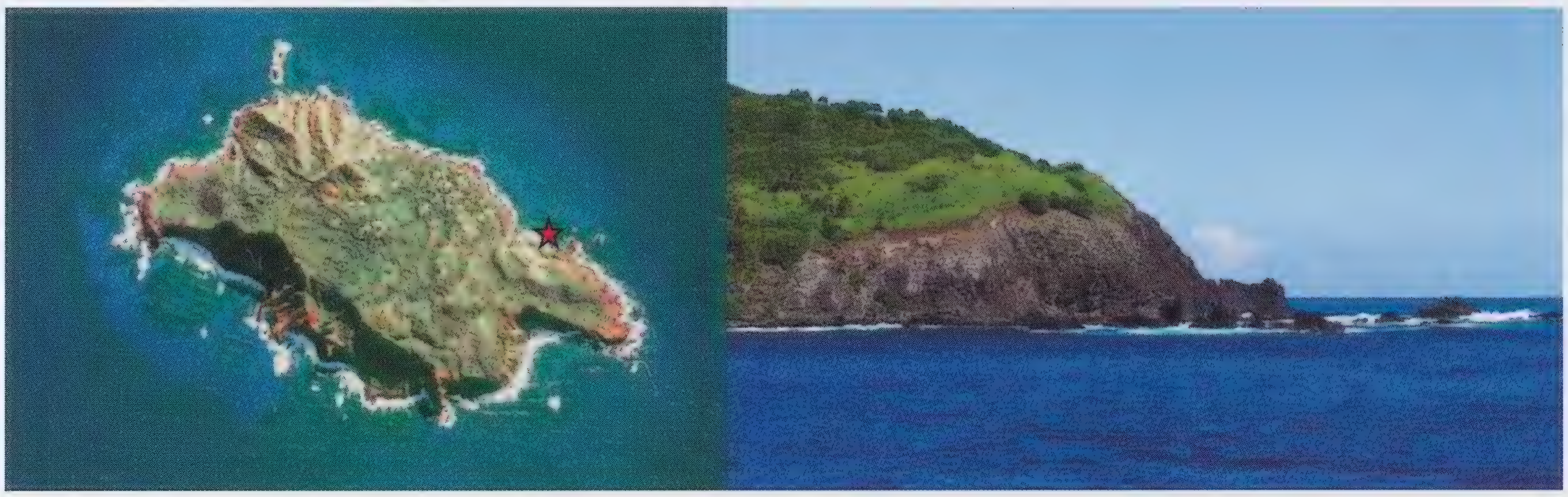

Figure 1. A= Satellite image of Pitcairn Island, https://earthview.withgoogle.com/map/pitcairn-islands-13907; **B**=View from offshore, https://www.worldatlas.com/articles/seven-of-the-world-s-most-remote-and-dangerous-islands.html.

The underwater terrain reflects the island and the surrounding ocean. The shoreline consists mainly of narrow rock ledges interspersed with narrow sections of rock beach (see Figure 1B). The constant swells make access to these areas feasible only during good weather and low tide. The swells and storms with their constant sweeping action have also resulted in a rather barren bottom. Coral growth is sparse and limited to isolated clumps. There is also very little of the rubble normally so productive for shell collecting even at 20 meters and deeper. Rather, the bottom drops to about 5-10 meters and then slopes gradually seaward. The bottom consists of rock substrate, covered with algae, interspersed with sand gullies and patches.

Henderson is an uplifted coral island located 120 miles Northeast of Pitcairn. It is approximately 6 miles long and 3.5 miles wide, oriented roughly in a North/South direction with the east side being slightly crescent shaped (see Figure 2A). The island has the appearance of a huge escarpment. With the exception of the NW and SW sections, the west side consists of cliffs, 35-40 meters in height, with virtually no access to the top of the island (see Figure 2B). The west is subject to constant open ocean swells and storms, creating impressive surge activity close to shore. The Northwest is the traditional overnight anchorage for Pitcairn Islanders and research vessels, and old mooring chains can be found on the bottom. It and the Southwest section have narrow sandy beaches. The East coast is not subject to the big swells of the west coast. Rather, it consists mainly of sand beaches and the beginnings of a fringing reef just offshore.

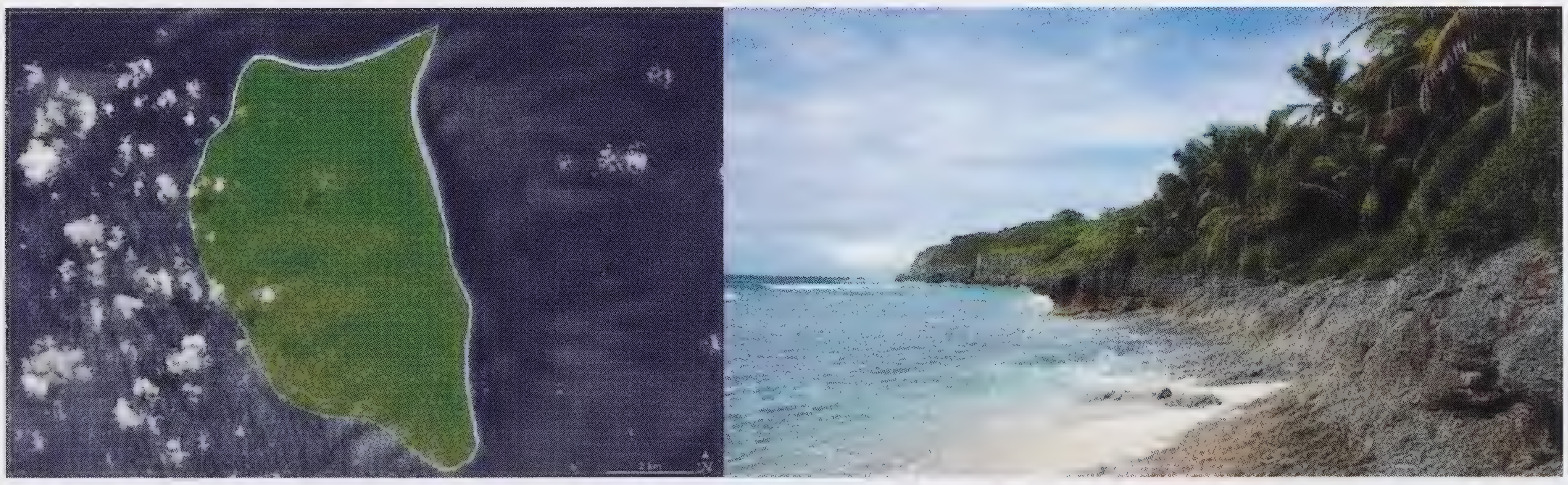

Figure 2. A= Satellite image of Henderson Island, https://visibleearth.nasa.gov/images/90572/the-remote-paradise-with-a-plastic-problem; **B**= View along the shore https://www.treehugger.com/henderson-island-most-remote-most-polluted-place-earth-4854408.

The island is uninhabited, although a Polynesian society did live on the island until about 600 years ago. The existence of endemic species consisting of four land birds (See Figure 3A Stephen's Lorikeet), nine plants, six land snails and one butterfly, have earned the island World Heritage status. Henderson also played a significant role in the ordeal of the survivors of the sinking of the whaling ship Essex in 1820 (see Figure 3B).

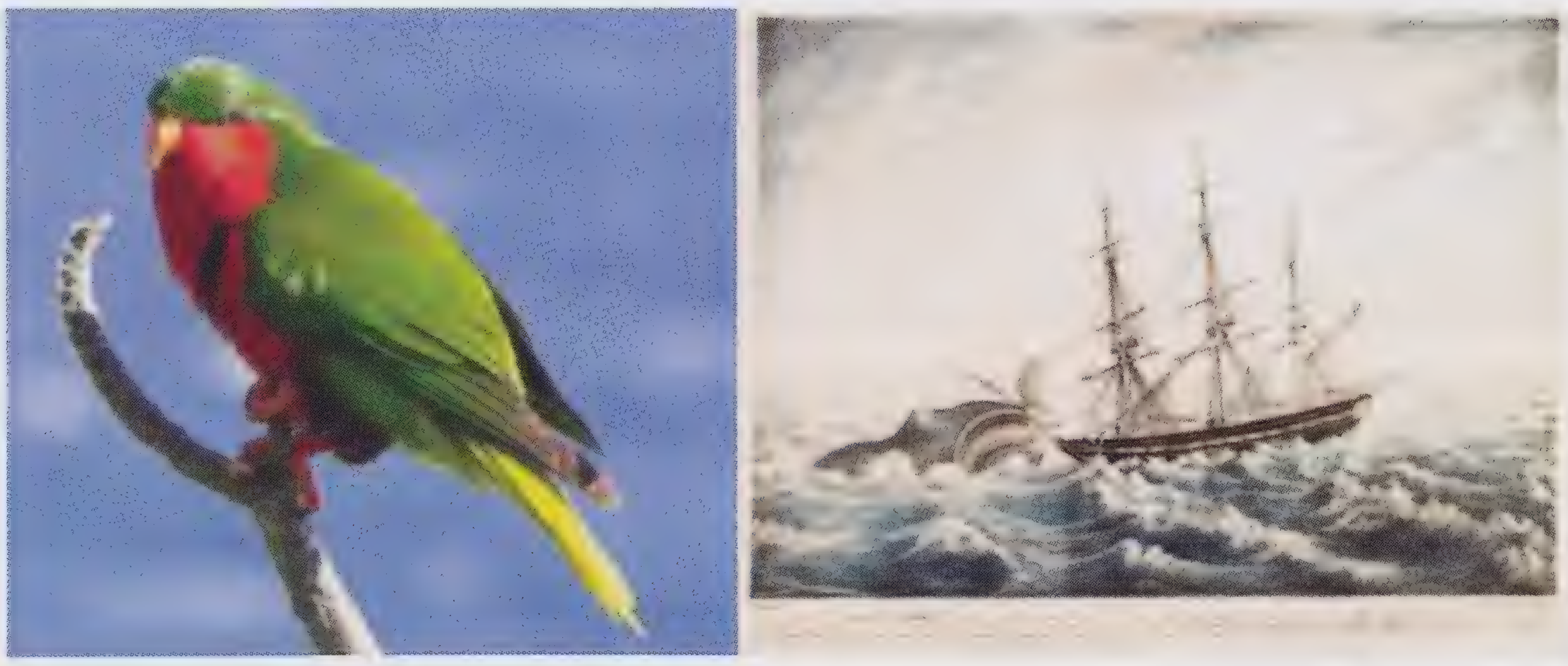

Figure 3. A= *Vini stephani* (Stephen's Lorikeet) one of the endemic birds of Henderson Island, https://naturalworldheritagesites.org/sites/henderson-island/; **B**= Lithograph of the sinking of the Essex by a whale, https://nha.org/research/nantucket-history/history-topics/the-earliest-picture-of-the-essex-disaster/ .

The coral life is more prolific at Henderson than at Pitcairn, although that is relative. The west side near shore consists of deep gullies, overhangs and swim throughs with the surge making diving hazardous. The bottom, quite flat and covered with low profile corals, then slopes quite steeply to well beyond sport diving depths. There are shallow gullies with little rubble, and there is an absence of overhangs and caves, creating a somewhat monotonous terrain. The island produces very little runoff and visibility is excellent; up to 40-60 m. The east side has better coral and a less severe bottom profile, but we were not able to dive here.

The Bounty Bay is not a fast boat; its normal cruising speed is 5-5.5 knots. So, with the distances to be traveled, the time on site is limited. The distances traveled on the ocean were approximately 800 miles, so one can estimate our hours/days at sea: sleeping, reading, computers, *etc*. We spent a half day at Oeno Atoll (see Figure 4A) with marginal diving conditions due to high surf, three days total at Pitcairn, a day and a half at Henderson and a day and a half in the vicinity of the Gambier Islands. The Bounty Bay was built as a research vessel and that was its primary function with about half of its charters to government organizations and universities doing surveys and environmental work (*e.g.* rat eradication and flora/fauna studies). Living and work spaces are Spartan but adaptable.

Figure 4. A= Satellite image of Oeno Atoll, https://www.visitpitcairn.pn/our_islands/index.html, **B=** Movie poster of The Bounty, 1984 starring Mel Gibson and Sir Anthony Hopkins.

The boat was capable of supporting scuba diving activity, but it cannot be considered a dive boat *per se*. Our trip was meant as a dive charter and the other divers were capable, but casual sport divers. As such, dives were oriented toward general interest rather than shell collecting. Also, night diving was not offered due to the remote locations and swells. With these limitations, divers were free to dive their own profiles. A total of twelve dives were made at Oeno Atoll, Bounty and West Harbour, Pitcairn, Northeast and West coasts of Henderson, Temoe Atoll (near Gambier) and Gambier Islands.

We were very lucky on our last day at Pitcairn Island. The seas were unusually calm and we were able to anchor in Bounty Bay; a very rare occurrence. Normally, boats and cruise ships anchored at Tedside (an abbreviation for “the other side” dated from the early mutineers) at West Harbour. By anchoring in Bounty Bay, we were able to dive on both the Cornwallis and the HMS Bounty. Both are in very shallow water: 2-8 m. The Cornwallis lost anchorage in the late 1800’s and drifted into rocks and sunk. There is still considerable wreckage of the bottom hull plates/ribs remaining as well as 5 huge anchors. The few remains of the Bounty are about 100 m away; only a few blocks, probably ballast, are seen. The surge is considerable in these areas, making photography difficult, but this day allowed very good visibility and some nice pictures. That night it rained heavily, so the next morning, the seas in the Bounty Bay were muddy brown! We were indeed lucky on our dives the day earlier!

In addition to the dives, we were able to acquire some shells from two Pitcairn Island families, speak with a local Pitcairn Island diver about his activities and view a number of shells in the local museum. The shells we collected were, with a few exceptions, very fresh dead. Shells are there but appear restricted in terms of diversity and quantity. Habitats are hard to access due to the need for protection from the strong ocean swells and waves. It would appear that this area represents the outer distribution limit for most species and, as such, the number of species and the number of specimens appear limited.

My interest is primarily focused on *Cypraea* and we were able through the above methods to confirm the existence of a number of species at Pitcairn and Henderson. Below is a list for each *Cypraea* species found at these islands.

PITCAIRN ISLAND
Monetaria caputserpentis (Linnaeus, 1758)
Mauritia maculifera scindata Lorenz, 2002
Mauritia mauritiana (Linnaeus, 1758)
Naria helvola sp.
Leporicypraea mappa admirabilis Lorenz, 2002
Lyncina schilderorum (Iredale, 1939)
Lyncina vitellus polynesia Schilder & Schilder, 1939

HENDERSON ISLAND
Monetaria caputserpentis (Linnaeus, 1758)
Pustularia bistrinotata sublaevis Schilder & Schilder 1938
Naria helvola sp.
Naria irrorate (Gray, 1828)
Lyncina schilderorum (Iredale, 1939)
Bistolida goodalli goodalli (Gray, 1832)

Additionally, the following are some of the few shells that we either found during our trip or were seen in the Pitcairn Museum:

Conus omaria Hwass in Bruguiére, 1792
Conus cf. *tahitensis* Hwass in Bruguiére, 1792
Conus tulipa (Linnaeus, 1758)
Conus ebraeus (Linnaeus, 1758)
Tridacna squamosus Lamarck, 1819
Drupa elegans (Broderip & Sowerby I, 1829)
Drupa Morum Röding, 1798
Spondylus linguaefelis (Linnaeus, 1758) (seen in the museum)
Tonna perdix (Linnaeus, 1758)
Harpa goodwini Rehder, 1993
Latirus nodatus (Gmelin, 1791)
Pecten sp. (2 species)
Nerita sp. (2 species)
Cassis sp. (2 species)
Balcis sp.
Conus cf. episcopatus da Motta, 1982
Conus miliaris Hwass in Bruguiére, 1792
Conus sponsalis nanus Sowerby, 1833
Conus chaldeus Röding, 1798
Turbo argyrostoma (Linnaeus, 1758)
Haliotis pulcherrima (Gmelin, 1791)
Pecten pallium Dall, 1908
Fusinus bounty Rehder & Wilson, 1975
Harpa goodwini Rehder, 1993
Bursa ranelloides ssp.
Limpets (2 species)
Spondylus sp.
Engina sp
Cerithium sp.

What is somewhat striking is the affinity these lists have with French Polynesia and to a lesser extent Hawaii. This is reinforced by conversations we had with one of the local divers. In the 1990s, he and others trapped lobsters in 40-60 fathoms in Bounty Bay. The catch was transferred to lobster pots in 20 meters where they were held and tended pending sale to passing ships. The lobster trapping was abandoned in the late 1990s when the volume of the catch fell below economic levels. Various shells came up as a byproduct of the catch. He was able to show us such deep-water specimens as *Fusinus galathea bountyi*, various *Bursa* and a few *Harpa goodwini*! All the shells were in fair to poor crabbed condition.

While the Pitcairn Islanders do dive to spear fish, they normally do not dive deeper than 20 meters for safety reasons. They do not actively collect shells as they do not assign any value to them. At times, they do search tide pools in the vicinity of Bounty Bay at night at low tide in search of bait for fishing. Occasionally, intertidal specimens such as *Monetaria caputserpentis*, *Mauritia maculifera* and *Mauritia mauritiana* are encountered and collected as decorative items. All are very rare.

An interesting exception occurred in 1994 when the son of the family with whom we were staying was tending the lobster pots at 20 meters mentioned above. During the dive, he spotted and collected a live, 96.3mm *Leporicypraea mappa admirabilis* adjacent to one of the pots. It is an exceptional specimen that had been in the family since it was collected and it is believed to be the only *mappa* collected by an Islander. It is now a prized specimen in the author's collection.

While diving in West Bay, Pitcairn Island, I found a live *Naria helvola* and a live *Lyncina schilderorum* under a very large boulder at 50 feet. Don Pisor found a live *helvola* at 55 feet at SE Point, Henderson Island. Both *helvola* have very dark dorsums as opposed to the lighter dorsums normally seen in *Naria callista*. This was the only live *Lyncina schilderorum* found on the trip, but they were plentiful as beach specimens at Henderson Island.

At Henderson Island, we were able to spend a couple hours combing the beach drift at the NW anchorage site. In addition to *Lyncina schilderorum*, we found several *Bistolida goodalli*, two of which were in excellent condition, three *Naria irrorata*, and a number of *Luria isabella controversa* and *Monetaria caputserpentis*. The *Pustularia bistrinotata* was found fresh dead at 35 feet. Many other species of other families were also collected, including several *Haliotis pulcherrima.*

So, is the trip worth the time and effort? If the purpose of the trip is four dives a day, spectacular drop-offs, beautiful coral and a suitcase full of shells to add to your collection, the answer is no. On the other hand, if the purpose is to have a great adventure, enjoying very different, interesting and contrasting above and below water ecosystems, adding a few nice specimens to your collection and, above all, sharing for a few days the lives of the open and very friendly Pitcairn Islanders, then it is most certainly worth it.

Note: Dr. Bradner (1915-2008) was a renowned physicist who enjoyed a long and distinguished career. During World War II he worked on the Manhattan Project. After the war, he worked at the University of California, Berkeley, where he is credited with inventing the neoprene wetsuit. He spent the rest of his career at the Scripps Institute of Oceanography. In 1996, Dr. Bradner, along with Dr. Alison Kay, authored: An Atlas of Cowrie Radulae (Mollusca: Gastropoda: Cypraeidae) The Festivus, Volume 38, which is still in use today." (See Plate 2 figure caption for further information)

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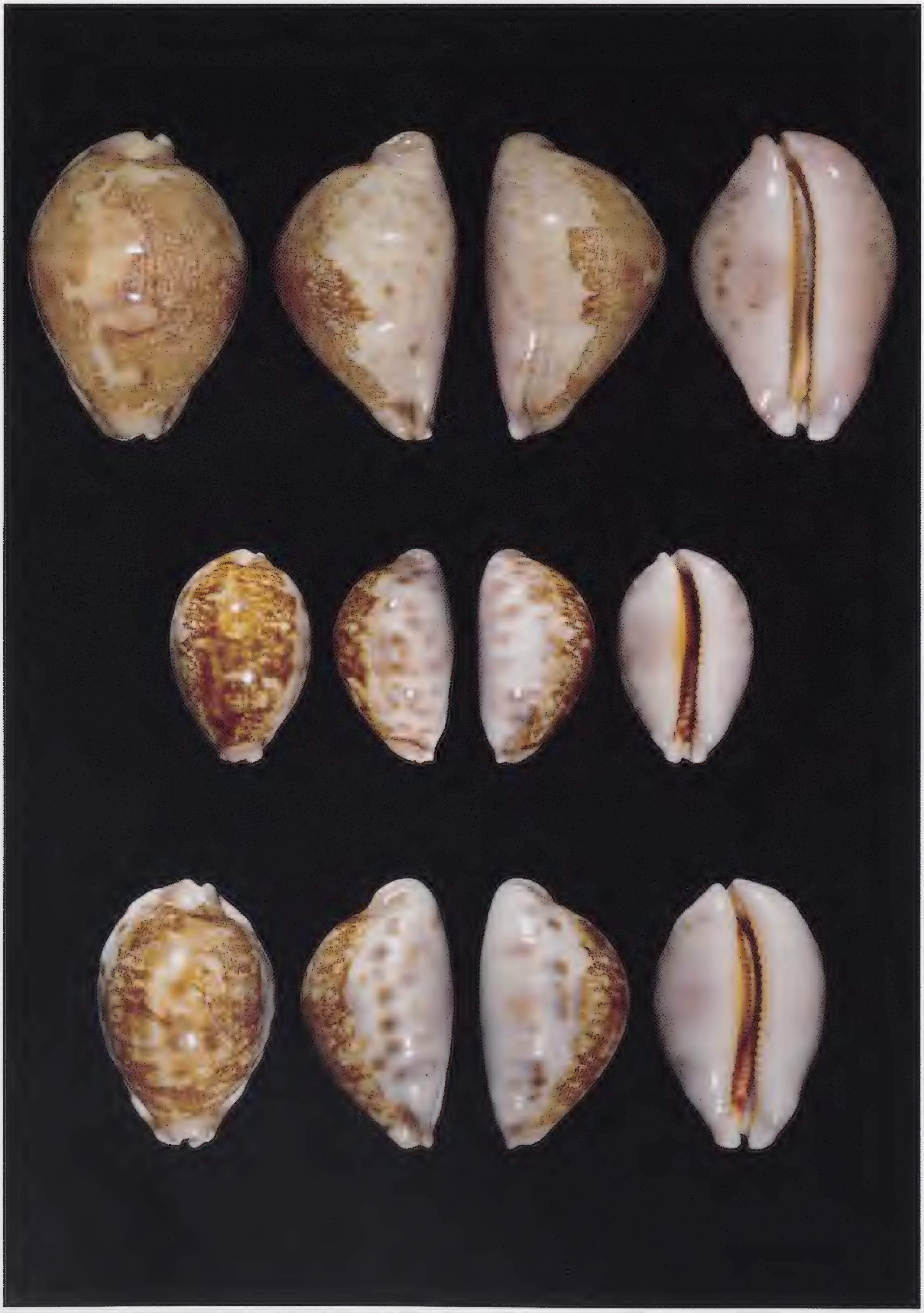

Plate 1. Top, *Leporicypraea mappa admirabilis,* Lorenz, 2002, 96.3 mm, Pitcairn Island; Middle and Bottom, *L. geographica rewa* (Steadman & Cotton, 1943), 48.2 mm and 60.1 mm, seamount near Pitcairn Island.

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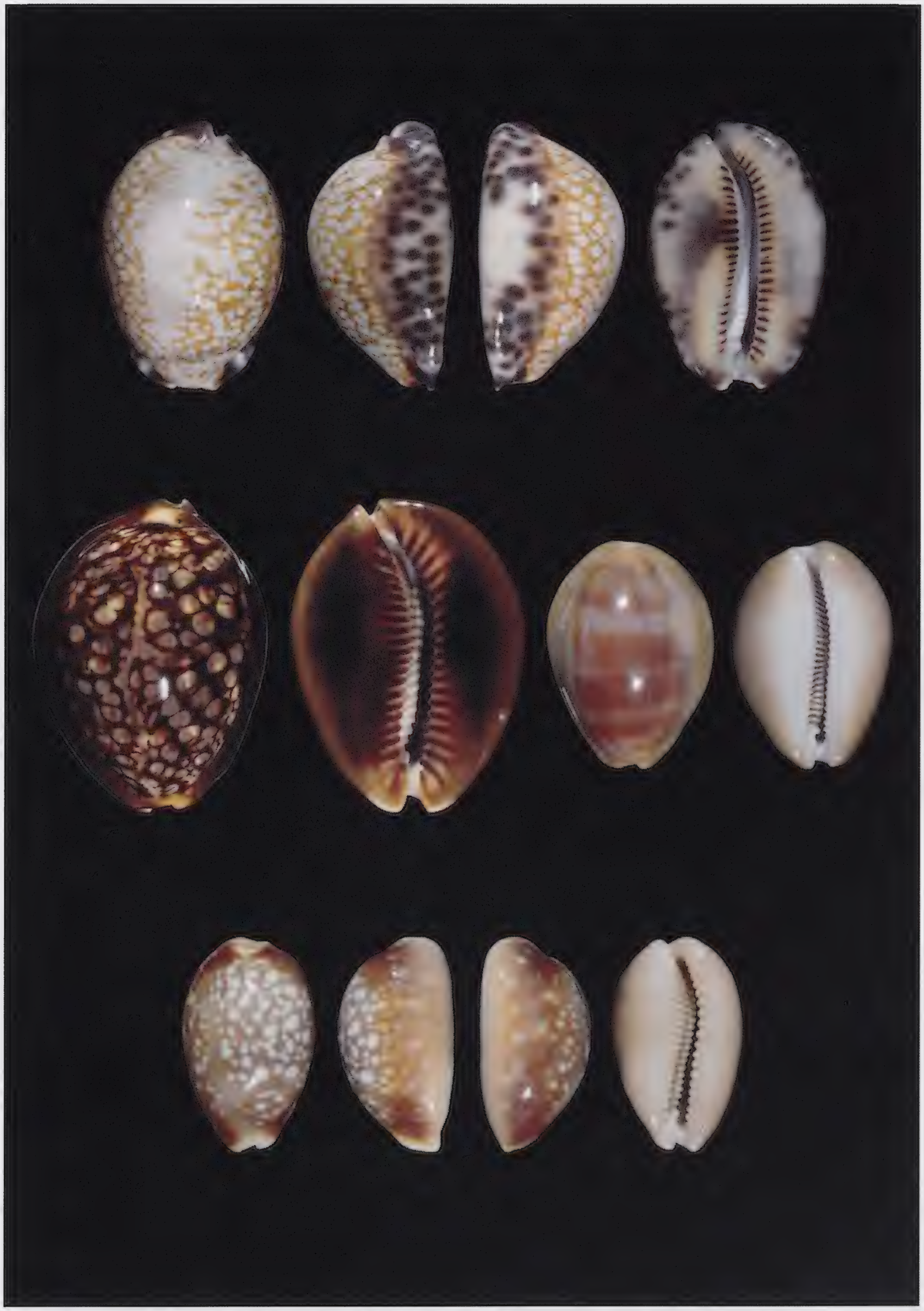

Plate 2. Top, *Mauritia maculifera scindata*, Lorenz, 2002, 72.7 mm, Pitcairn Island; Middle left, *Mauritia mauritiana*, (Linnaeus, 1758), 66.9 mm, Pitcairn Island; Middle right, *Lyncina schilderorum* (Iredale, 1939), 33.8 mm, Henderson Island; and *Lyncina vitellus polynesia,* (Schilder & Schilder, 1939) 31.5 mm, seamount near Pitcairn Island. In 2002, my friend, Don Pisor, was able to acquire two unusual *Leporicypraea geographica* cf. *rewa* (Steadman & Cotton 1943), both of these are shown in Plate 1 above and the *Lyncina vitellus polynesia* (Schilder & Schilder 1939) from Hugh Bradner, Ph.D., which were labeled "from a seamount area near Pitcairn Island".

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Herpeteros chaceorum: Genitive-ending Emendation of *Micrarionta chacei* Willett, 1940 (Gastropoda: Heterobranchia: Eupulmonata: Stylommatophora)

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The intention of the author as written in the original description of a new species determines which rules of suffix termination should apply, whether it be an adjective, an eponym, or a noun in apposition. When Willett (1940) described the new species *Micrarionta chacei*, he wrote, "I take pleasure in naming this shell for Mr. & Mrs. Emory [sic] Chace, who are well and favorably known, not only for their diligence in collecting, but for their willingness to coöperate with other students of conchology" (p. 82). The International Code of Zoological Nomenclature (4th Edition), Article 31.1.2, clearly stipulates the mandatory use of the correct Latin genitive endings: *-i* for masculine singular, *-ae* for feminine singular, *-orum* for two or more males or a male and a female, and *-arum* for two or more females. Moreover, it states (Articles 32.3 and 34.2) that when these rules have not been followed in the original description, the suffix ending must be changed.

Since this species is clearly named for a male and a female, the genitive termination should be corrected from *chacei* to *chaceorum*, with the binomial combination of *Herpeteros chaceorum* (Willett, 1940). The generic placement follows Roth (1996).

This is not the first Willett species receiving a corrective genitive-ending emendation. Willett (1939) proposed *Lamellaria sharoni* [*sic*], based upon specimens collected at Anaheim Bay, California, by Mrs. Rubie E. Sharon. J. Q. Burch (1946) emended Willett's original name to its correct Latin form, from *sharoni* to *sharonae*. Today it is recognized as *Hainotis sharonae* (Willett, 1939).

An interesting exception to this rule is seen in the southern California marine gastropod, *Vitrinella williamsoni* Dall in Williamson, 1892. As carefully explained in the original description, the species "is respectfully dedicated to Mrs. M. Burton Williamson, to whose researches this paper is due. The name being inherently masculine [*i.e.,* Son of William], the usual genitive ending is preserved" (Williamson, 1892, pg. 202).

The helminthoglyptid snail *Herpeteros chaceorum* is known only from a few individuals found at or near the type locality, the lower end of El Tigre Canyon, 9 miles north of Ensenada, Baja California (see map in Smith *et al*., 1990: pg. 139). The original description did not give a full description of the site. Today there is a small rancho/vineyard named El Tigre east of Salsipuedes (31° 57' 14.92" N; 116° 44' 55.64" W). From there a creek creates a canyon that goes down to unite with the Arroyo Del Carmen, near Highway 3. Somewhere along the highway, either at El Tigre ranch or where the highway crosses over El Tigre Creek close to the Del Carmen Creek, would have been the easiest access to the canyon from what in 1937 was the original road through the area.

This species has a relatively high-spired shell, with 5-5 1/4 whorls (Figures 1 and 2, holotype and label). The umbilicus is almost entirely covered by the expanded columella. The thin, polished periostracum is a buffy brown, encircled by a conspicuous dark brown band about 1-1.5 mm in width. The shell can reach 22 mm in diameter.

ACKNOWLEDGMENTS

I thank Barry Roth for helpful comments on this matter, Miguel Angel del Río Portilla and Michael Wilken-Robertson of Ensenada for their information on the type locality, and Lindsey Groves for allowing me to use his photographs of the holotype material in the collections of the Natural History Museum of Los Angeles County.

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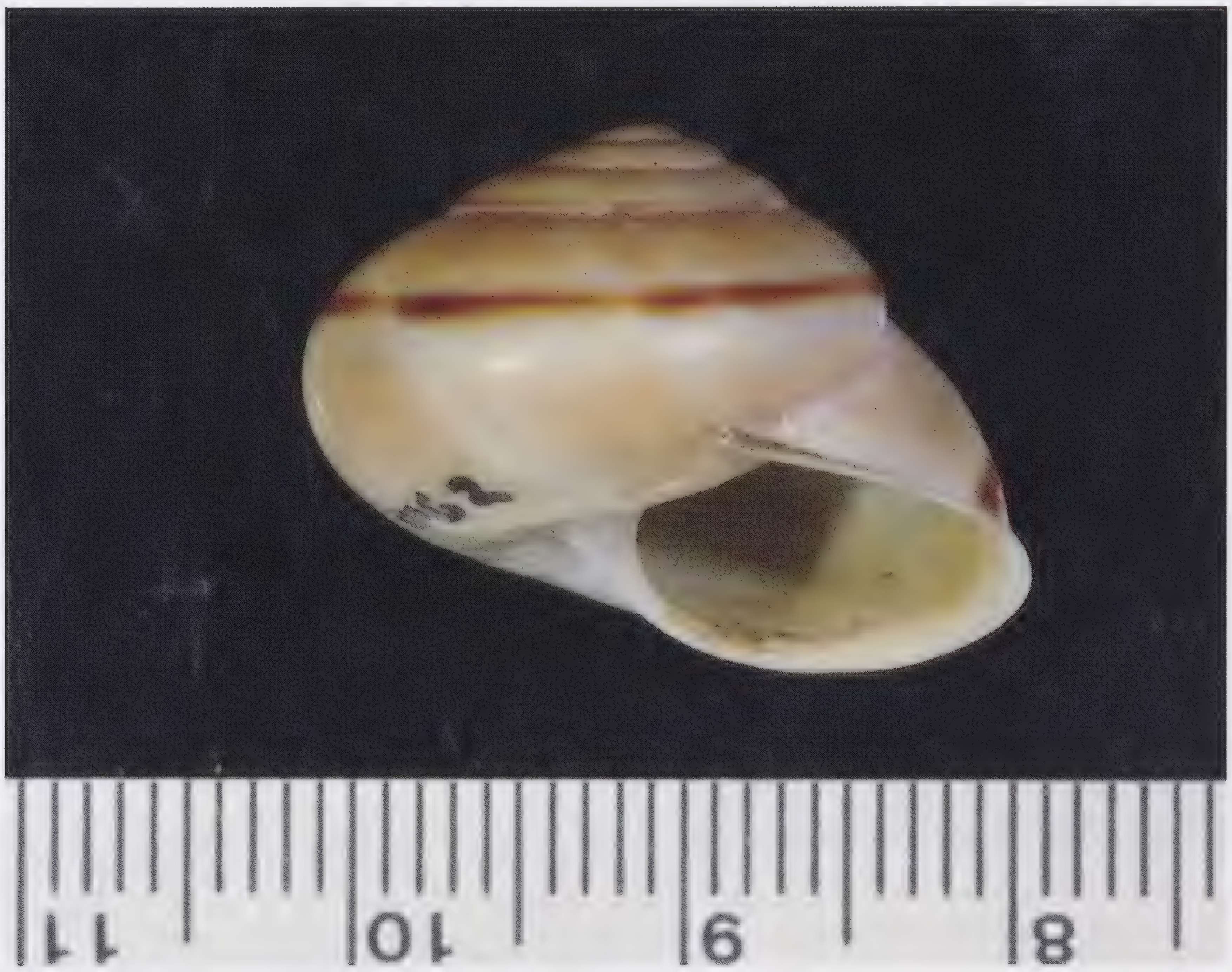
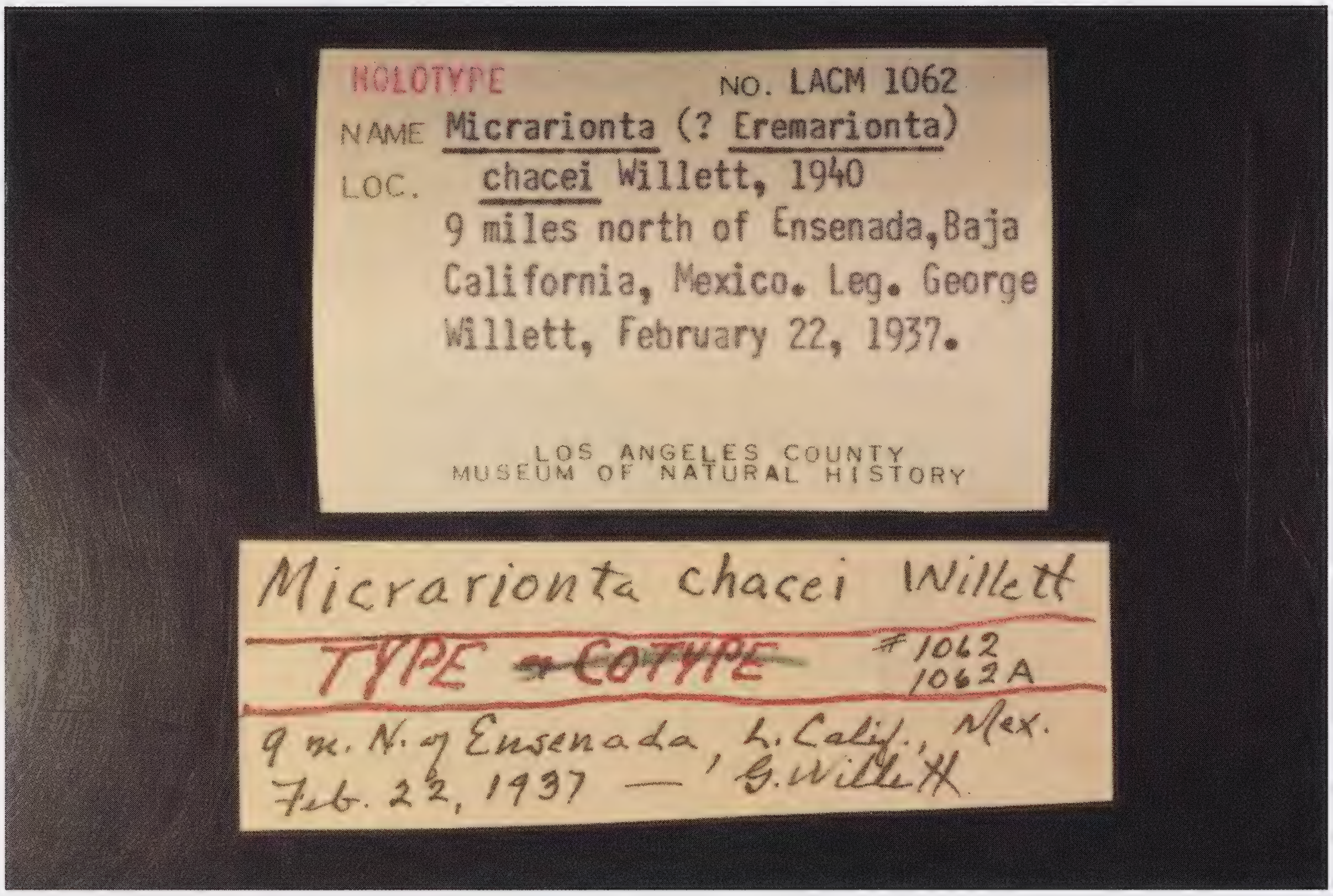


Figure 1. Apertural view of holotype of "*Micrarionta chacei*," Natural History Museum of Los Angeles County, type series #1092. Photo by Lindsey Groves.



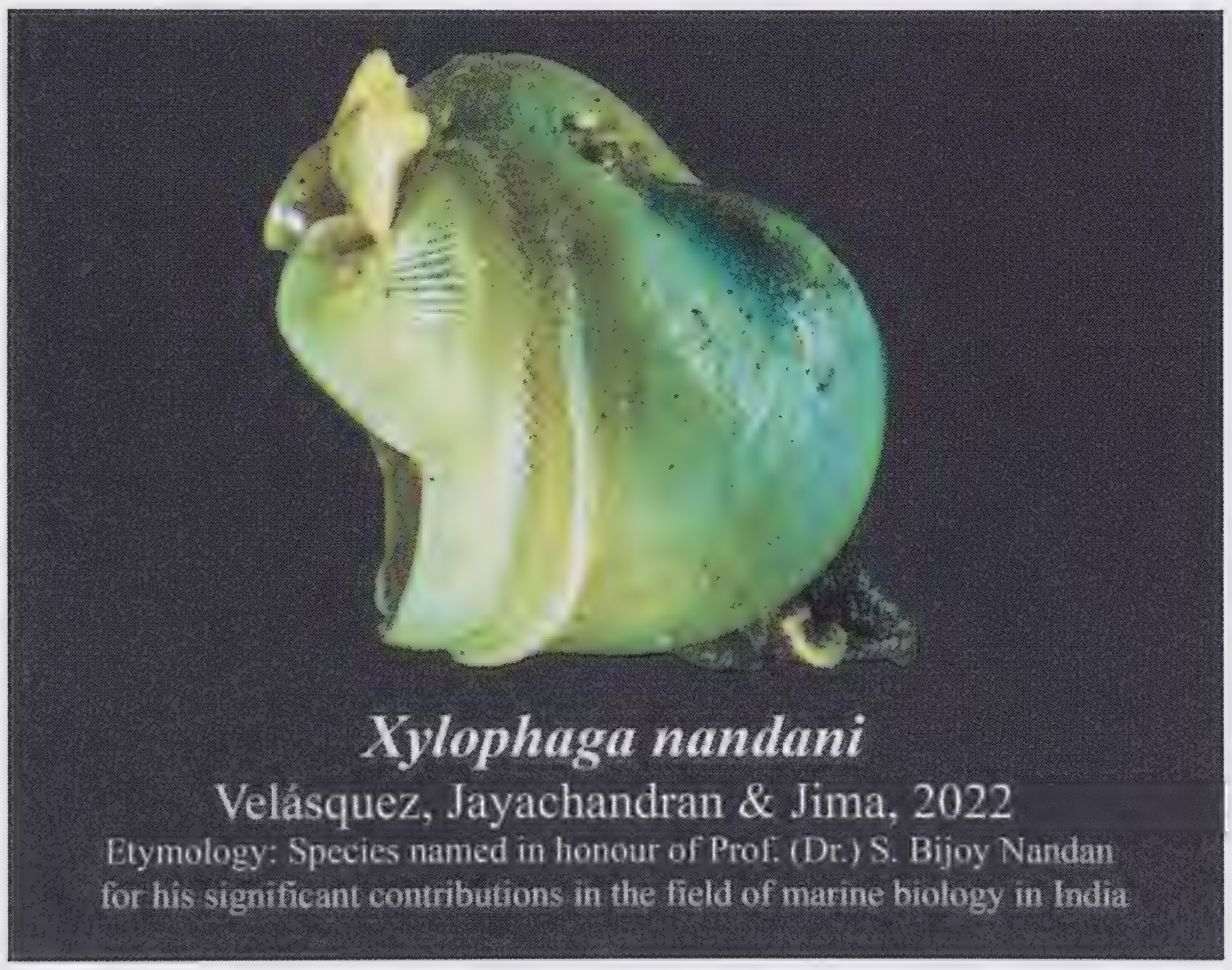
HOLOTYPE NO. LACM 1062
NAME Micrarionta (? Eremarionta)
LOC. chacei Willett, 1940
9 miles north of Ensenada, Baja
California, Mexico. Leg. George
Willett, February 22, 1937.

LOS ANGELES COUNTY
MUSEUM OF NATURAL HISTORY

Micrarionta chacei Willett
TYPE ~~a COTYPE~~ #1062
1062A
9 m. N. of Ensenada, L. Calif., Mex.
Feb. 22, 1937 — G. Willett

Figure 2. Original and type labels of holotype of "*Micrarionta chacei.*" Photo by Lindsey Groves.

Taxonomic Note: *Xylophaga nandani* Velásquez, Jayachandran, & Jima 2022



Xylophaga nandani
Velásquez, Jayachandran & Jima, 2022
Etymology: Species named in honour of Prof. (Dr.) S. Bijoy Nandan for his significant contributions in the field of marine biology in India

A new species of wood-boring bivalve *Xylophaga nandani* sp. nov. is described based on material obtained from floating woods collected with a bongo net on the eastern Arabian Sea. The new species is morphologically closest to the members of the genus *Xylophaga* sensu stricto (*cf.* "Clade 4" of Romano *et al.* 2020), and can be distinguished from all of them by a combination of morphological characters, such as the laterally pointed, triangular mesoplax; siphon with a simple row of large, coarse papillae placed immediately next to the furrow on the lateral incurrent siphon; and an oval concentration of numerous white cone-shaped granules with pointed, slightly curved tips on lateral siphon distal to excurrent opening. (from Abstract)

Jayachandran, P.R., Velásquez, M. & Jima, M. 2022. A new species of wood-boring bivalve (Mollusca: Xylophagaidae) from the Eastern Arabian Sea. Marine Biodiversity 52, article 7. https://doi.org/10.1007/s12526-021-01245-1

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On the *variegata* trail: finding a Cryptic South African Chiton Beauty - *Acanthochitona variegata* (Nierstrasz, 1906)

Mike Els, Photography by Renée Els

In the early 1990s on a free week afternoon from my studies I was alone collecting Chitons using Scuba a short distance south of Simonstown harbour in roughly 6 m of cool water on sandy flat reef. *Ischnochiton oniscus* in their myriad of colors and patterns were abundant beneath the thin layer of sand covering the reef, with *Hyalina capensis* common in the sand, together with occasional *Marginella rosea*, light pink at this locality. One of the tiny Chitons I collected was a golden-brown *Acanthochiton* species of approximately 8 mm which I did not recognize. I exchanged it with a local shell dealer expecting to receive an identification later, but never heard of it again.

Years later in the early 2000's just east of the present Coega harbour, I found a similar specimen beneath a rock in 1 m of turbulent intertidal water. This specimen was larger than the False Bay specimen and was a rather drab tan-brown in colour. Identification remained a problem.

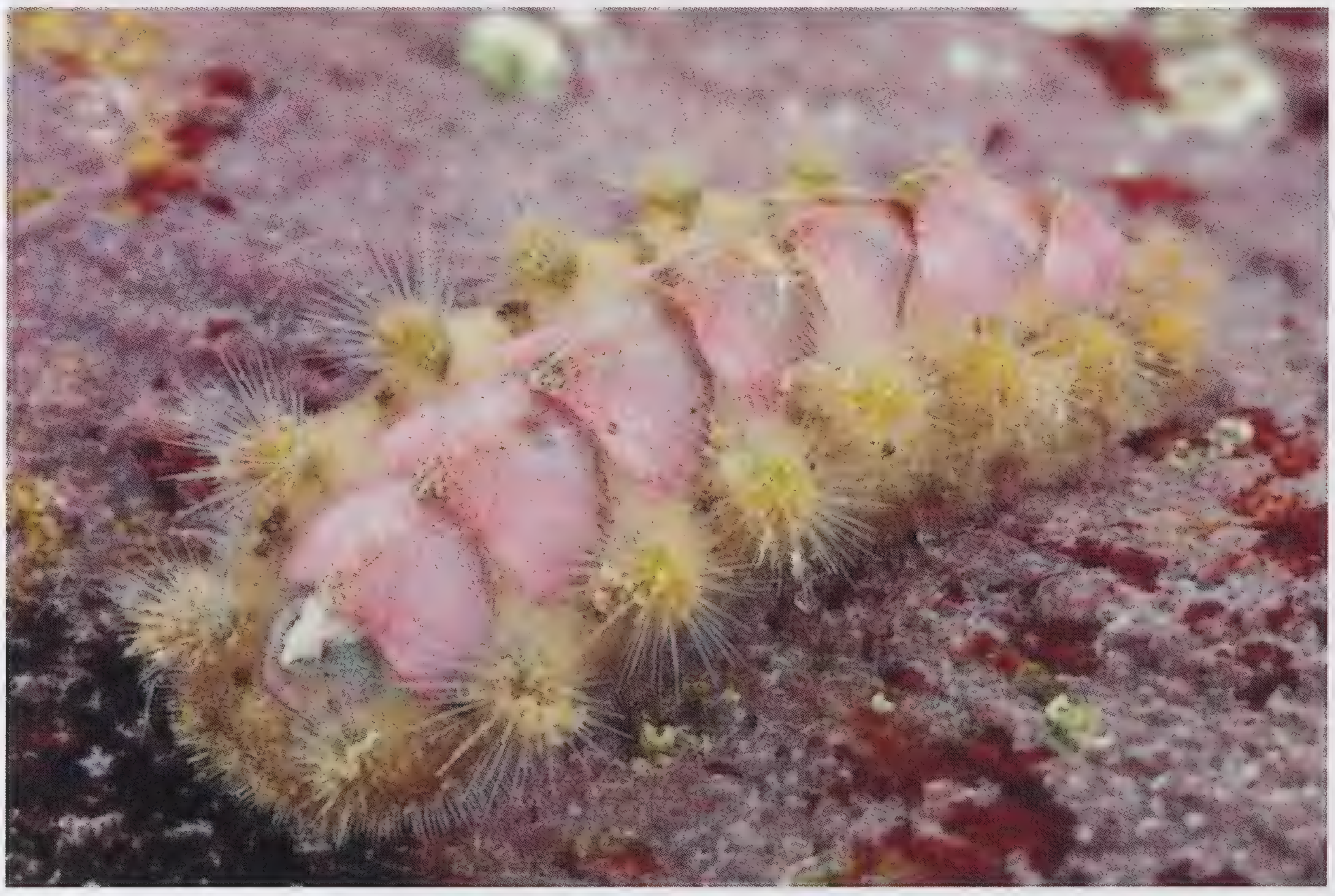

Figure 1. Living specimen, not in true habitat.

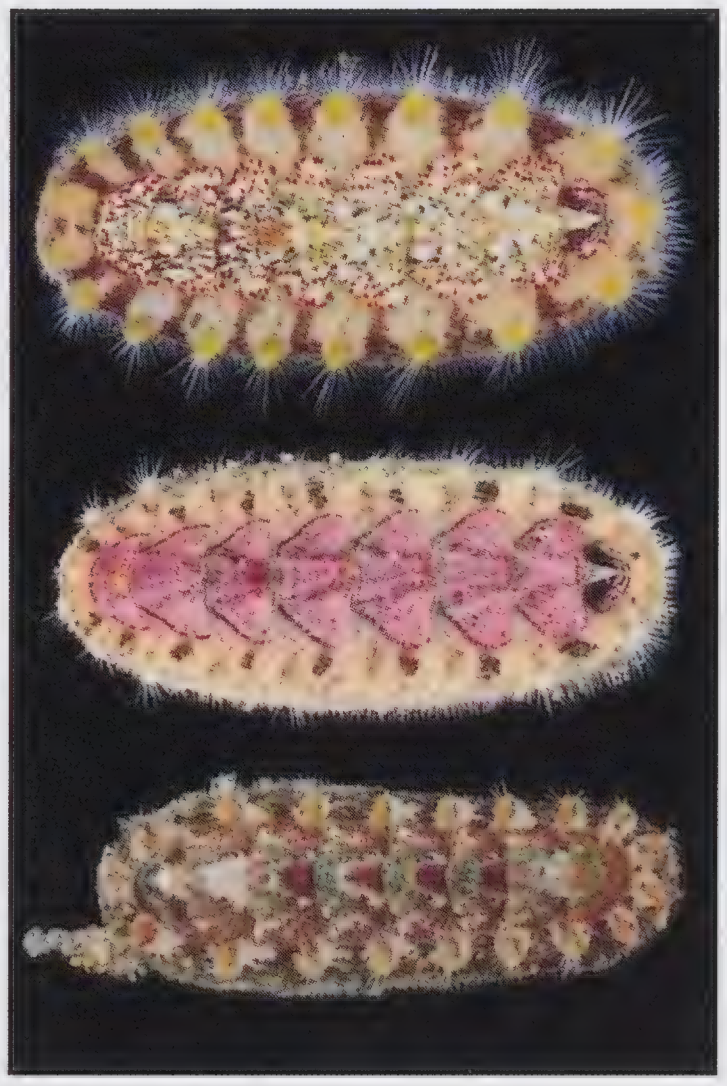

Figure 2. Colour variation.

Circa 2008 I was snorkeling for patellas along Marine Drive in Port Elizabeth. I returned home with 6 large *Patella barbara*, all densely covered with coralline seaweed interspersed with sponges and other growth, all of which had a base of compact sand filling the grooves between the ridges on the shells. Whilst cleaning off the encrusting growth on one, I encountered yet another of these enigmatic Acanthochitonas, brown-green and amazingly camouflaged between the dense encrustations. These patellas were collected exposed on rocks at 1.5 m in a high-energy wave zone, indicating that the dense encrustations and shell grooves provided sufficient protection from the turbulent water to allow the little chiton to happily live on the patella.

Renée and I both now had our curiosity thoroughly piqued. Although the true identification of the False Bay specimen shall be forever unknown to us, these *Acanthochitona* species were not illustrated in any of the recent popular South African conchological literature, but a specimen identified as *Acanthochitona variegata* Nierstrasz 1906 was illustrated in Chitons of the World - An illustrated synopsis of recent Polyplacophora, by F.J. Slieker. Thus motivated we embarked on a search for more specimens.

We found them to be widespread and locally common in certain areas with suitable habitat (as is the case with most mollusks). Their ideal habitat is on rocks lying in clean sand, often in wave-washed turbulent areas, usually close to the low tide mark. They do not enjoy exposure to dry air/desiccation or pools that are heated to any significant degree by the sun. Cleaner sand is preferred. Sub-tidally I have collected them down to 12 m under rocks on a sandy turbulent bottom with scattered rocks. Few other species seem to be able to survive in such an unfriendly environment except for the ubiquitous *Ischnochiton oniscus* (Krauss, 1848).

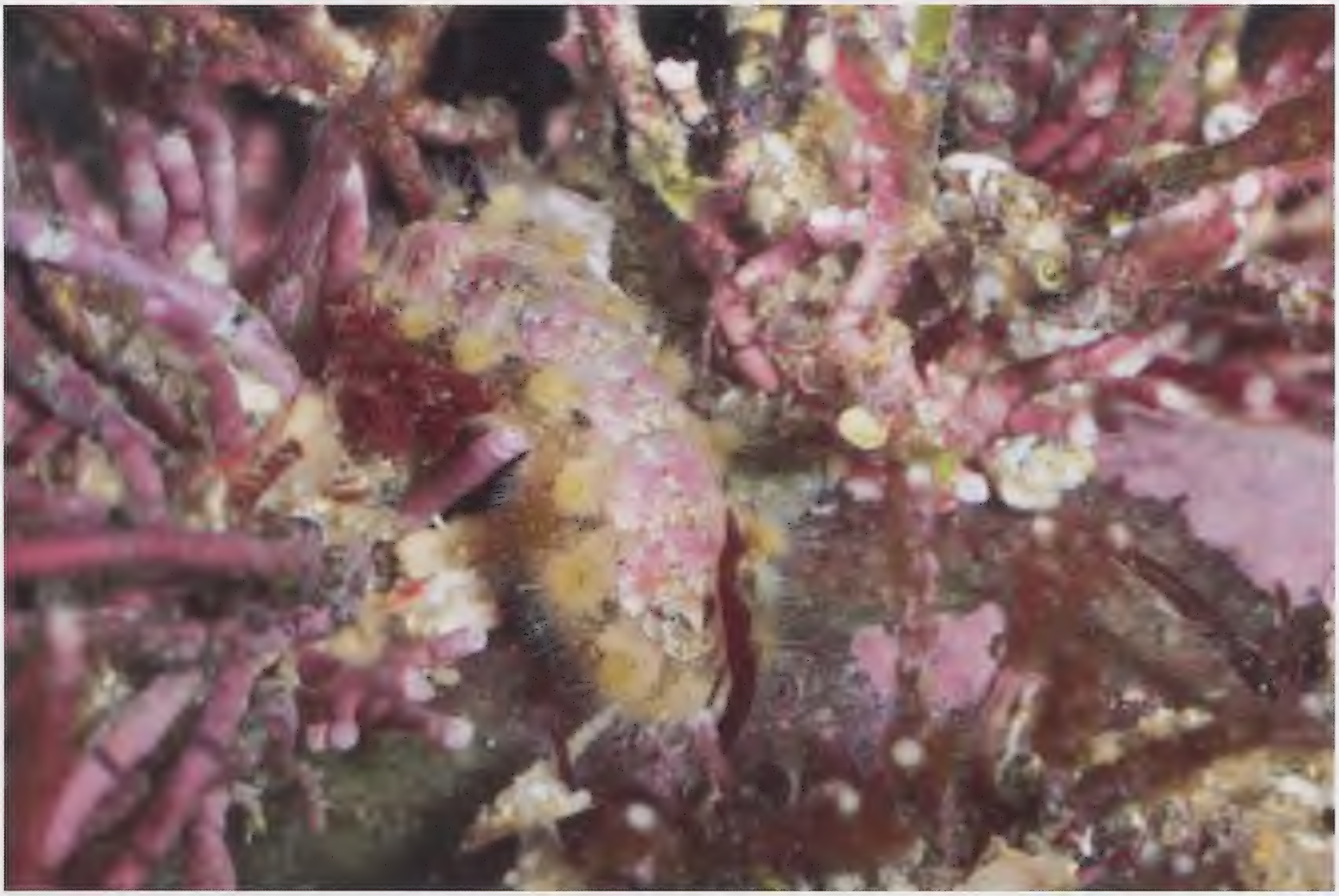

Figure 3. In natural habitat between coralline algae (which was trimmed to allow photography - entirely obscured prior to trimming).

We found the species to be not uncommon in certain areas, but most surprising was that their palette of colours can rival any of our other South African Chitons - lime green, rose red, all shades of pink, near-fluorescent orange, yellow, all shades of brown, violet, shades of purple - the combinations are stunning. Even the bundles of spicules vary in colour.

However, as is the case in some families which exhibit highly irregular sculpture such as *Murex* and *Spondylus*, the multiple spicules serve a dual purpose - both in defense (although, unlike *A. garnoti*, they are harmless to human skin), and in forming highly efficient traps for sand and detritus which often completely obscures the little chitons – an excellent disguise from predators. A brief splash of seawater will bring out their beauty by washing off the poorly-adherent debris and silt.

They are also relatively flexible and can fold themselves in and around sharp angles on their rocky substrate or insinuate themselves into irregular nooks, cracks and crannies. They are not strongly adherent to the substrate (in comparison to most other local species) and a gentle probe with a blunt knife allows them to be easily lifted off.

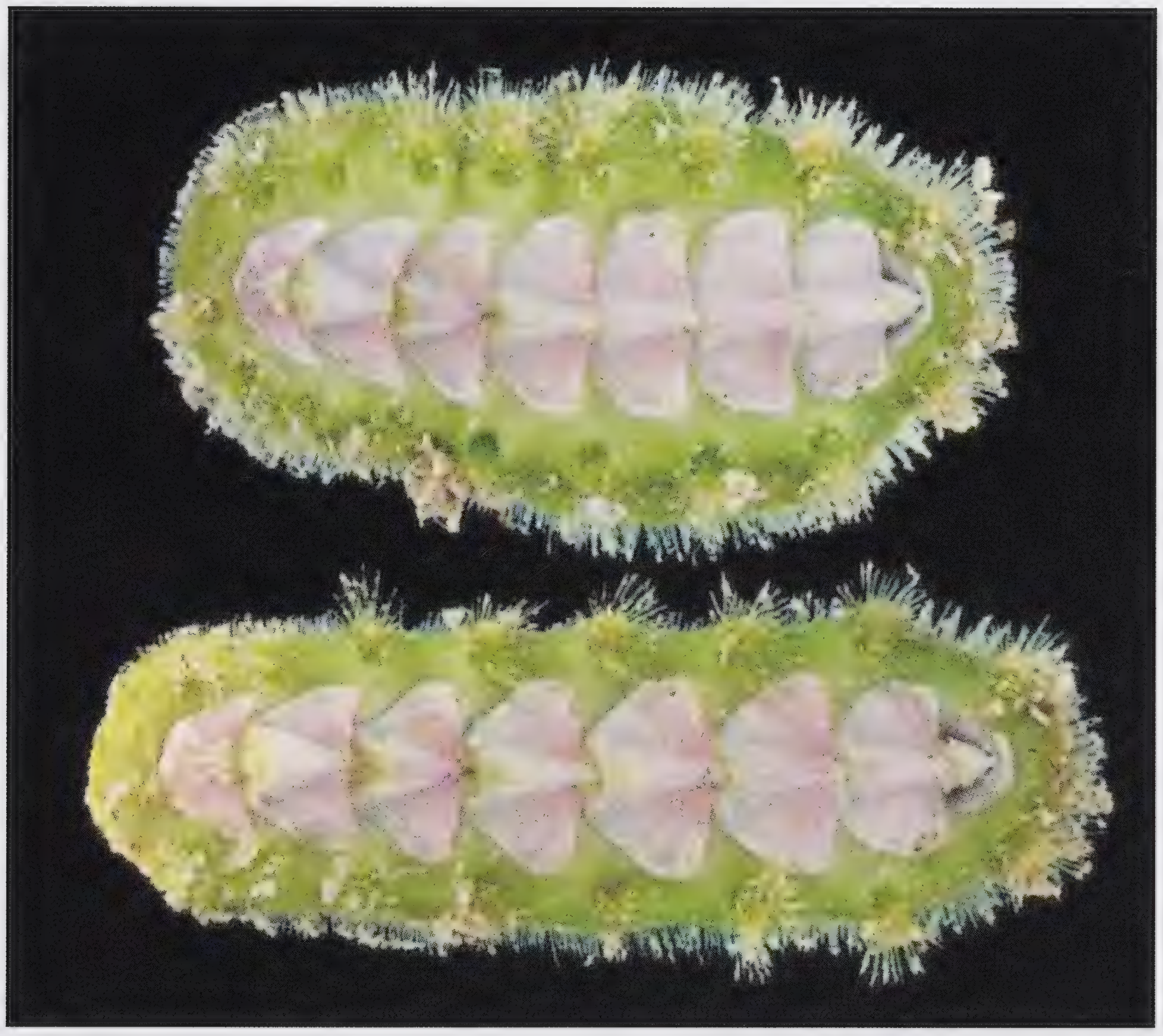

Figure 4. Same specimen: contracted above and expanded below. *A. variegata* with lime green girdle – a colour seldom seen in South African mollusks; although it can be seen in *Chaetopleura umgaziana*, and frequently in *Tricolia* spp.

Mobility.

In a bucket of fresh sea water, they can move fairly rapidly (for a chiton). This is a distinct advantage in their preferred turbulent habitat. They enjoy small rocks in turbulent, wave-washed areas, usually partly embedded in sand, just above, or at, the rock-sand junction. In rough seas or changing currents, the sand may shift within hours. Any species that cannot move fairly rapidly may be deeply buried. Their mobility is therefore most likely an evolutionary trait allowing them to flourish in this unforgiving ecological niche. The general characteristics of *Acanthochitona* are:

- A relatively large portion of each valve is buried in the girdle;
- 18 tufts (or pores) of spicules: 4 around the head valve, the rest at the sides of each suture.

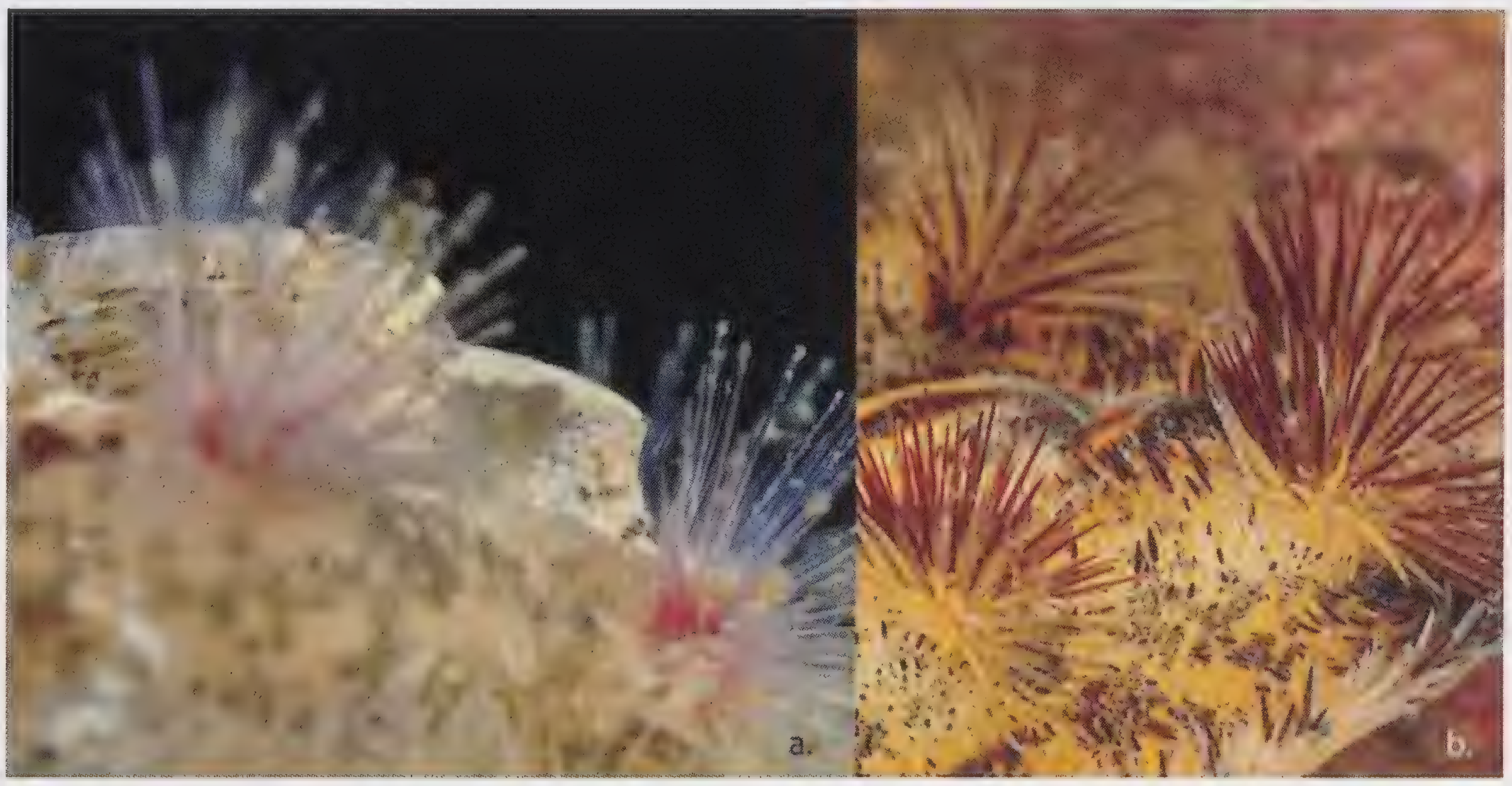

Figure 5a. *A. variegata* tail valve; **b.** *A. garnoti* tail valve hidden between the bristles.

There are 3 species *Acanthochitona* in South African waters. All occur intertidally, *A. variegata*, *A. jegotenuis* (a Mozambican chiton that reaches northern Kwazulu-Natal), and *A. garnoti* (the well-known intertidal bristled chiton). The following table summarize their differences:

	A. garnoti	***A. jugotenuis***	***A. variegata***
Size	30-40 mm	23-30 mm	Holotype 6x2.5 mm. 14-20 mm
Elevation	Lowest (depressed) valves beaked when not eroded	Intermediate	Highest, valves beaked
Valve Granules	Oval	Round, flat-topped to slightly concave	Oval to round, pierced
Tail valve	Wider than long	Slightly longer than wide	Is as long as it is wide
Mucro	More posterior	Slightly posterior	Slightly posterior
Posterior slope		Convex	Concave
Inside of valves	Deep blue-green, always central purple-brown spot	Light blueish green to milk-white	Pink
Girdle spines	Straight	Curved, 0.4-0.5 mm long	Straight
Girdle tuft spines	Straight, >2 mm	Curved, 1.6-2 mm long, 80 um thick	Straight, 0.65 mm long
Behavior	Walks openly in rock pools at night, often exposed in air		Discrete and camouflaged, always in water

Table 1. Comparison of *A. garnoti, A. jugotenuis, A. variegata.*

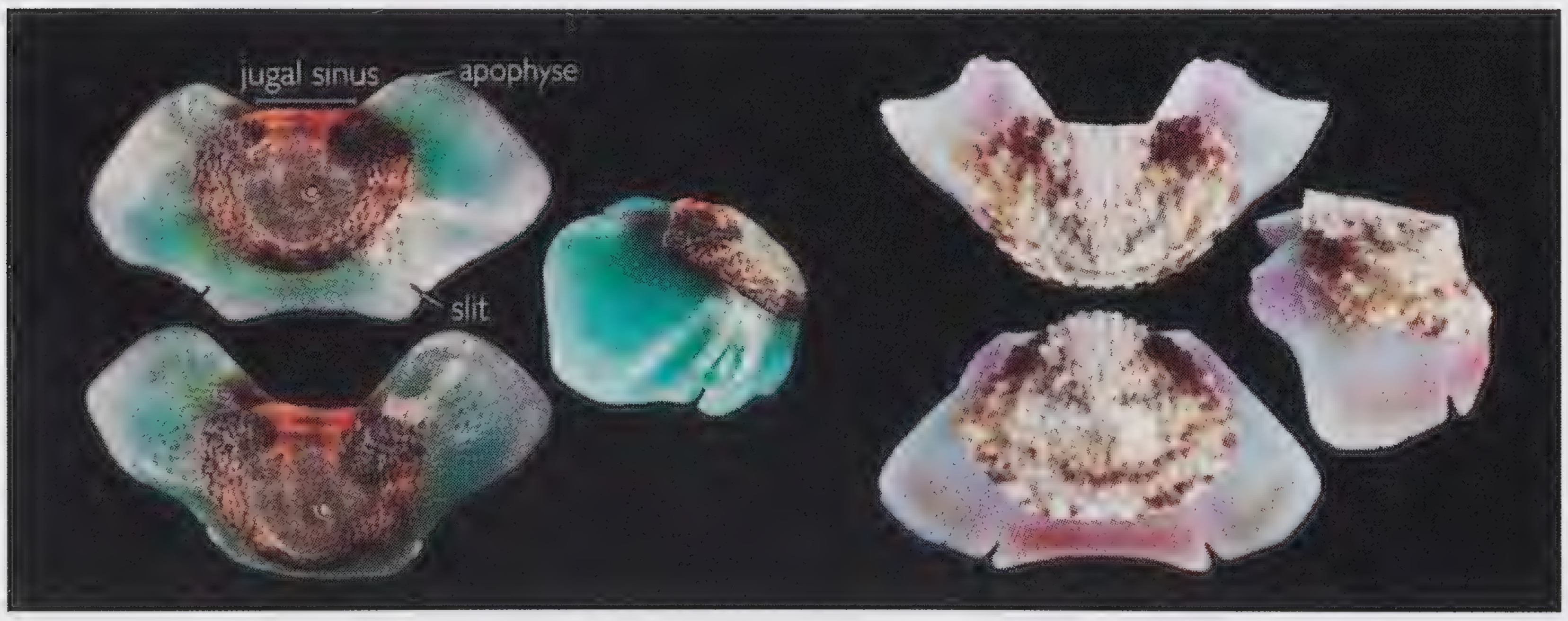

Figure 6. *A. garnoti* tail valve on the left with blue-green articulamentum, *A. variegata* tail valve on the right.

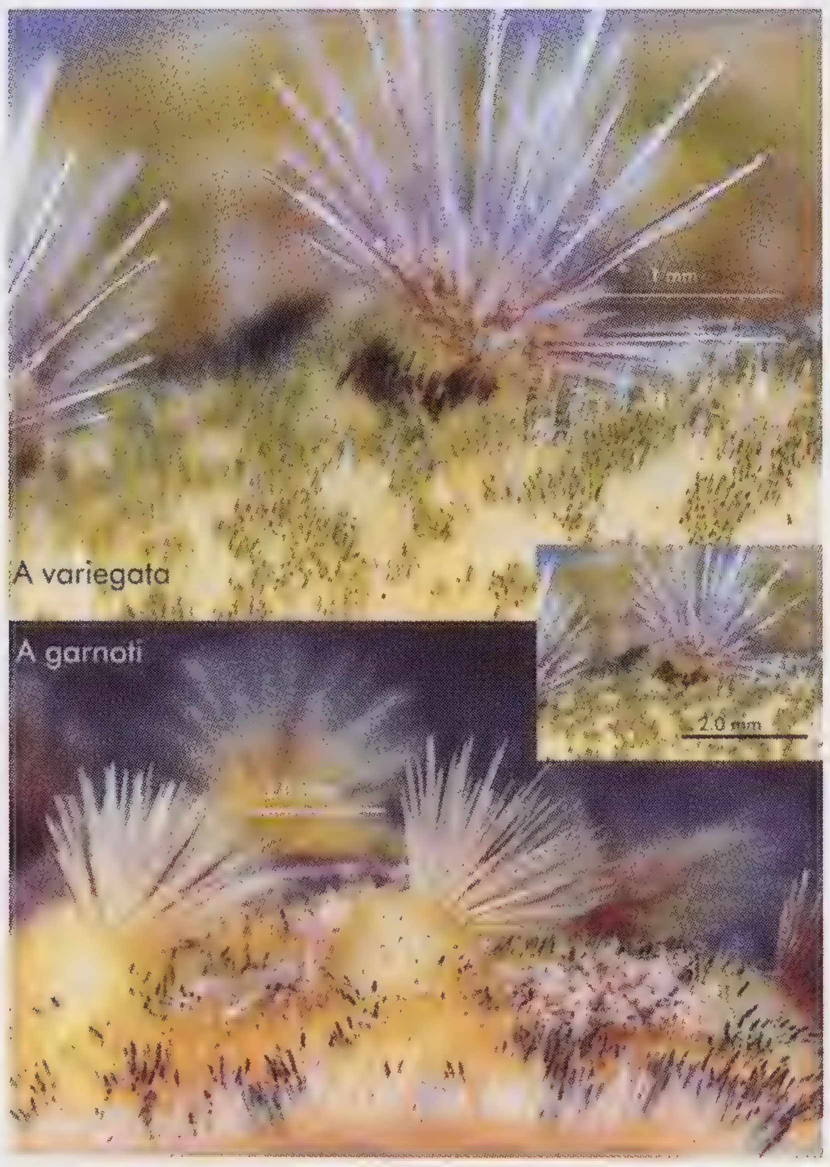

Figure 7. Bristles: Comparison between *A. variegata* and *A. garnoti*. Smaller insert is to scale with *A. garnoti.* ⟶

Spawning.
We have observed a group of this species in a small container of clear water. After several hours 2 specimens were observed releasing gametes. One individual released white sperm and the other numerous tiny eggs (see accompanying images). Chitons are either cupulous (free-spawning – as *A. variegata* shows) or non-cupulous (brooding - such as *Chiton nigrovirens*).

This behavior has previously been documented in gastropod species in containers following collection (see prior discussion on malacological forum Conch-L) and we have also observed mass spawning in an aquarium by six *Conus eucoronatus* approximately 48 hours after collection from 96 m. This may be a response to stress experienced by the organisms or may be due to unknown chemoreceptor stimuli experienced by a group of the same species placed in a confined small body of water.

The eggs have an interesting surface. It is ordained with delicate parachute structures. The cupules on the hull of the egg focus sperm to specific areas of the egg surface for fertilization.

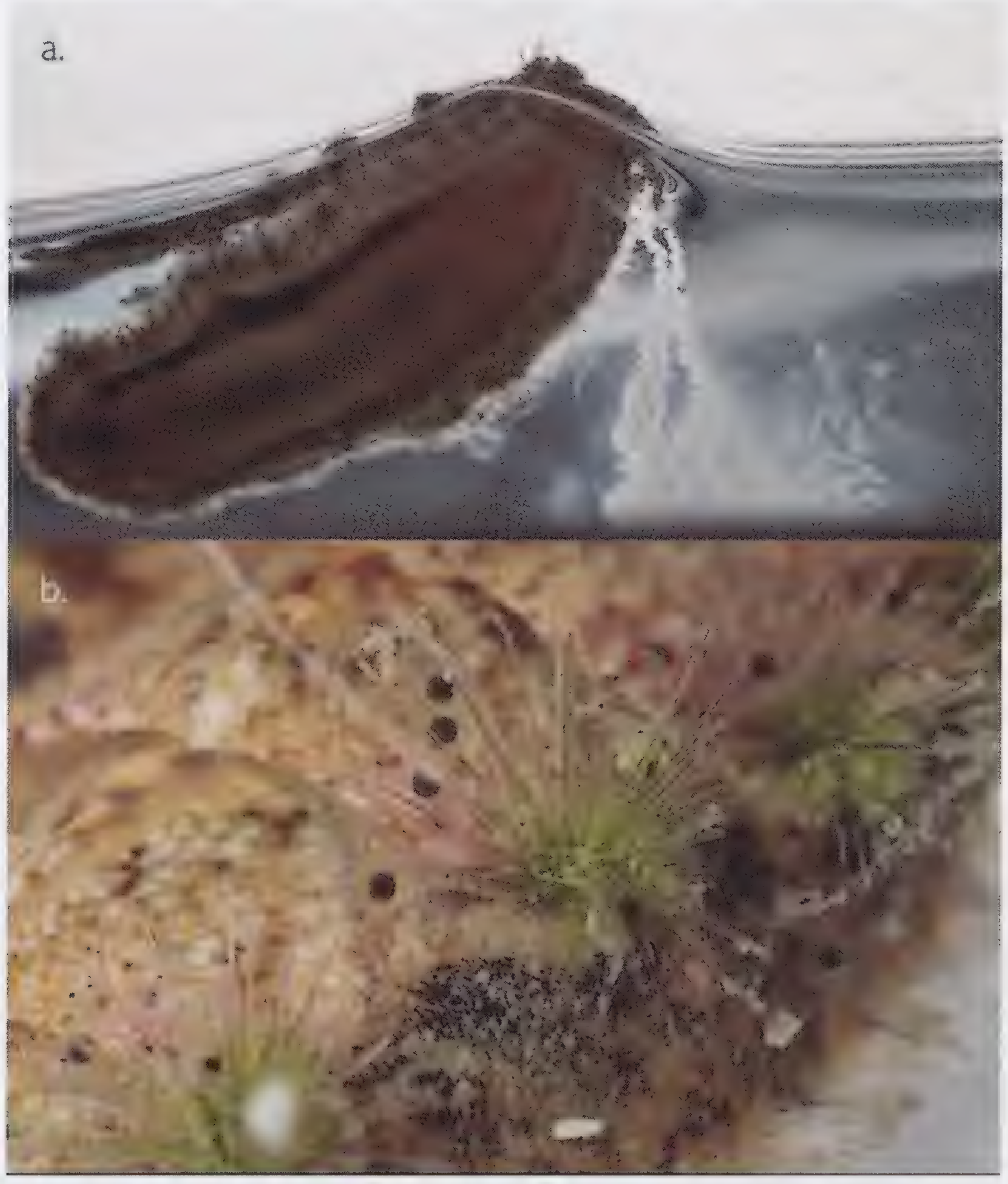

Figure 8a. *A. variegata* releasing sperm from gonadophore. **b.** Eggs noted in the bristles of another *A. variegata.*

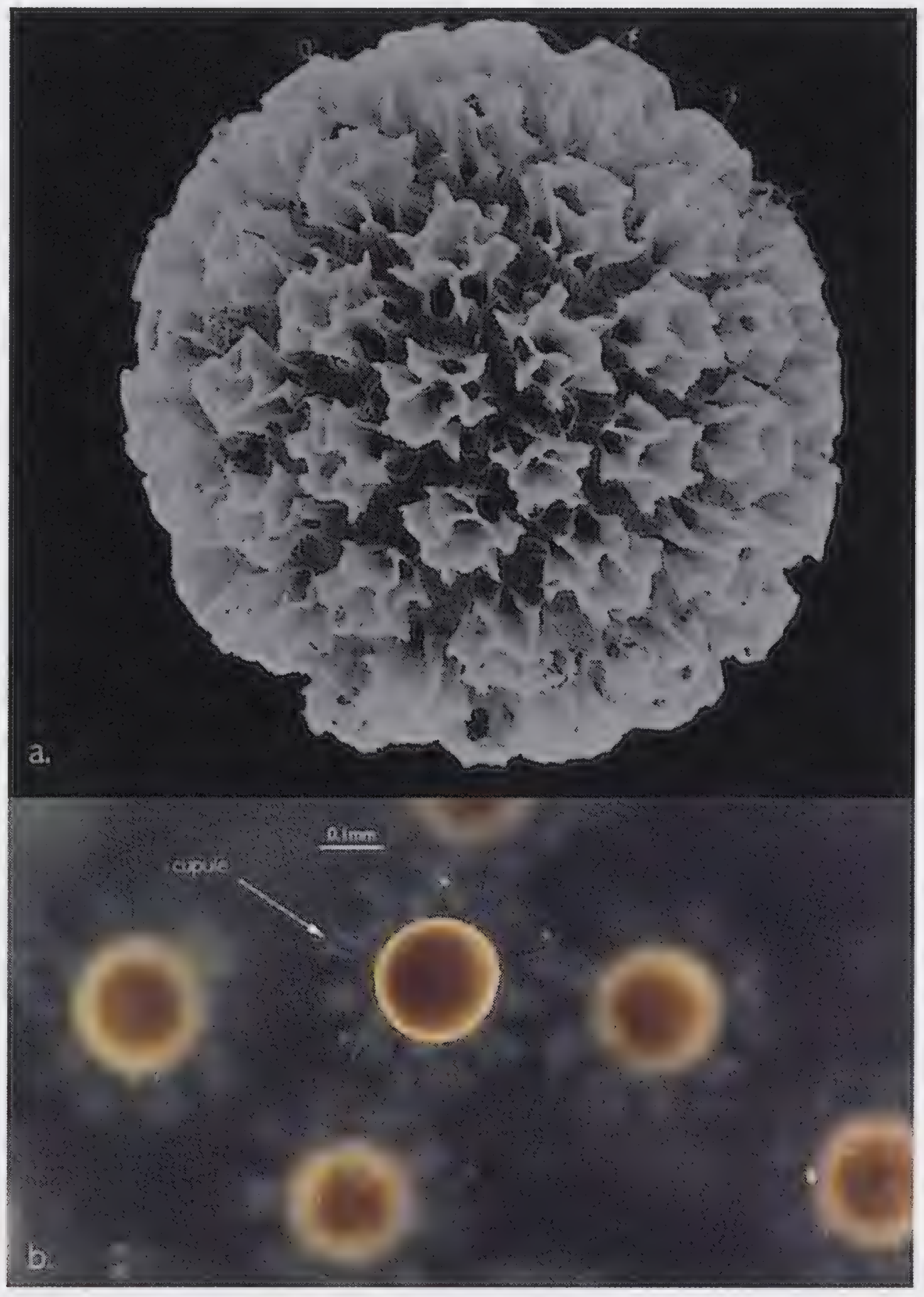

Figure 9a. SEM photo of the hull cupules on an egg of *Mopalia muscosa.* Courtesy of Prof Buckland-Nicks from St. Francis Xavier University, Nova Scotia, Canada. **b.** Under our stereoscopic microscope we got the impression that *A. variegata* eggs may look possibly slightly like Figure 10a.

Shortly after the above observations, microscopic evaluation revealed that egg fertilization had occurred, and cell division was taking place. Following photography, we returned the water with eggs to a gully in an area with known healthy populations and wished them well on their journeys.

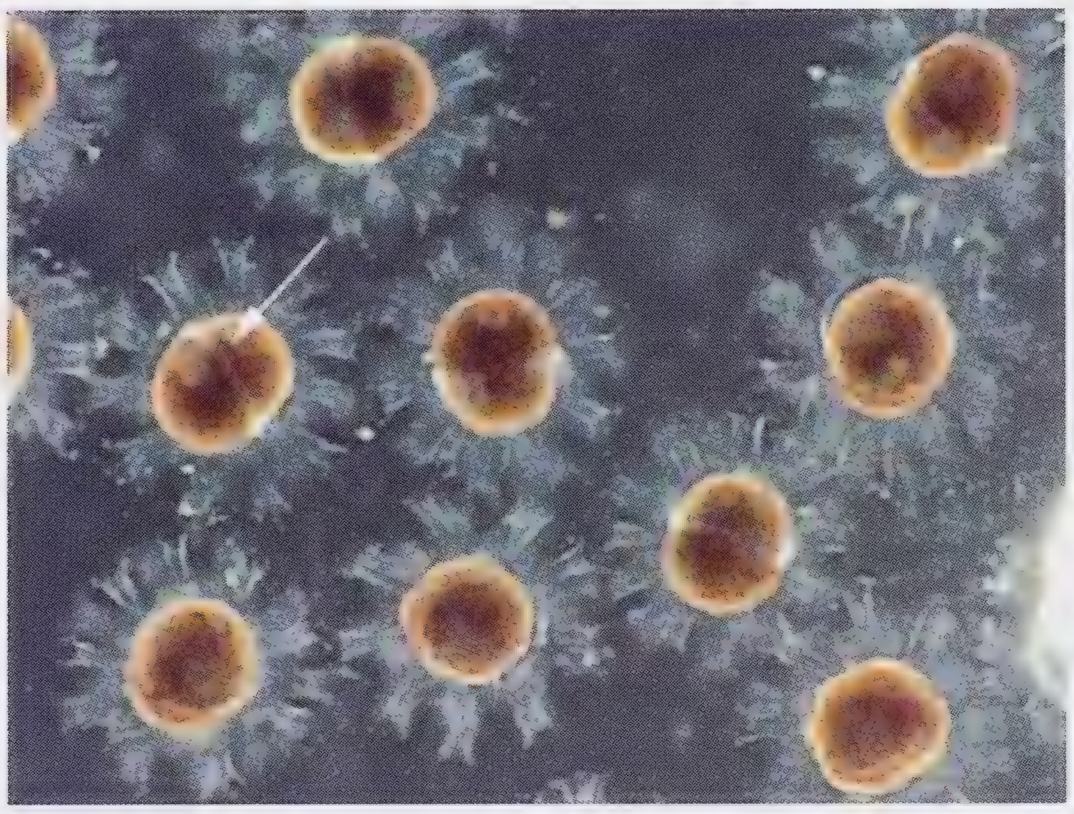

Figure 10. Cell division in eggs of *A. variegata* shortly after fertilization. Note varying stages of development.

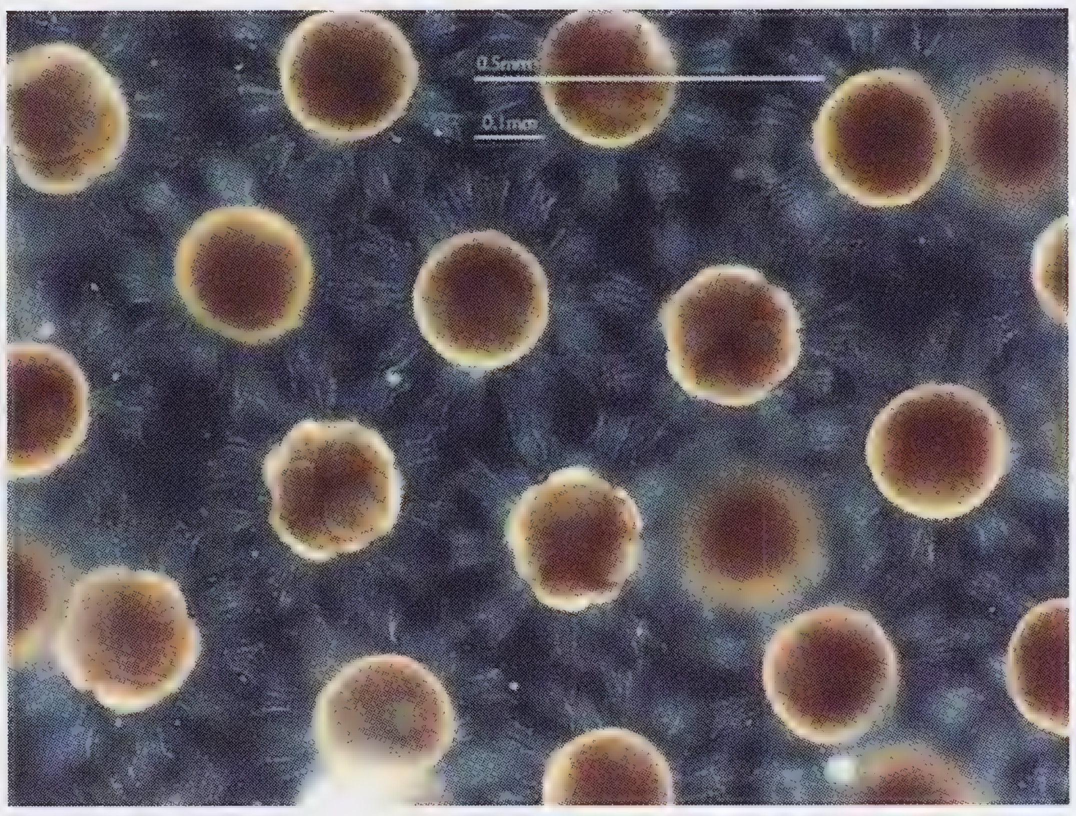

Figure 11. Apparent trochophore larvae in the early stages of development of *A. variegata*. Arrow points to the ciliary band starting to develop.

Remarks.

The range of this little chiton, based on our experience, is therefore from Algoa Bay (Marine Drive) in the south-west until at least Cintsa, East London, in the north-east. In Slieker the type locality is given as Natal. Nierstrasz described the holotype from a single 6x2.5 mm specimen from Natal. He was not sure of the exact location and documented it as either from the "beach at Illovo" or from "Isipingo". We are unsure of the identity of the *Acanthochitona* specimen we collected in False Bay but a more southern range extension from the above is to be expected (Slieker specimen listed as from False Bay although photograph does not permit accurate identification). An eastern range extension is also to be expected given the holotype locality.

As with most chiton species, the living specimens show their brilliant colours best. The colour is enhanced by studio lighting during photography. Preserving *A. variegata* with their spines undamaged is in itself a problem. So if you find this beautiful but seldom-illustrated small species, admire them in the sunlight, gently touch them (their bristles are not very hard or irritant) and gently replace their rock in exactly the same position it was found, so that you may again admire them on your next visit.

Acknowledgements

I thank Professor Buckland-Nicks from St. Francis Xavier University, Nova Scotia, Canada for providing a high resolution SEM photo, and Marise Ferreira and Renée Els for proof reading.

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Thomas C. (Tom) Rice (1939-2022)

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It is with great sadness that we report the passing of Tom Rice, one on the world's greatest shelling Icons formerly of Port Gamble, Washington, Phuket Island, Thailand (2003) and residing most recently in Bangkok, Thailand (2018).

Tom was an active shell collector since the 1950's and through his efforts was able to bring the shell collectors of the world together, from the simplest beach comber to professional Conchologists and Malacologists. In 1973, Tom opened a museum, the "Of Sea and Shore" that is located on the upper floors of the Pope and Talbot general store building, in the historic logging town of Port Gamble, Washington. The Museum is still open today and displays Tom's collection as well as other sea life that he was able to acquire over more than 60 years of world travel. The museum served as his base of operations until he moved to Thailand in the early 2000's.

Tom published prolifically in many journals, was co-founder of conchological clubs and organizations, including the Pacific Northwest Shell Club in 1960, and the Conchologists of America, in 1972. In 1970, Tom created Of Sea and Shore, a magazine that was published until 2008. This publication brought shellers from around the world together and gave them a forum to enjoy their hobby. Tom also published and updated, the invaluable Catalog of dealers prices for shells, marine, fresh-water and land (24 ed. 1965-2007, often referred to as "Rice's Prices"), A Sheller's Directory of Clubs, Books, Periodicals & Dealers (27th ed. 1966-2005), the Directory of Conchologists and Malacologist (4th ed., 2000), A Checklist of the Shelled Marine Molluscs of the Oregonian Province (2000), and many others including the classic Marine Shells of the Pacific Northwest (1972), that introduced myself and countless other collectors to the rich mollusk fauna of the Salish Sea (Puget Sound and vicinity), British Columbia, and Alaska.

His passing is a great loss to conchology and malacology. He will be greatly missed!

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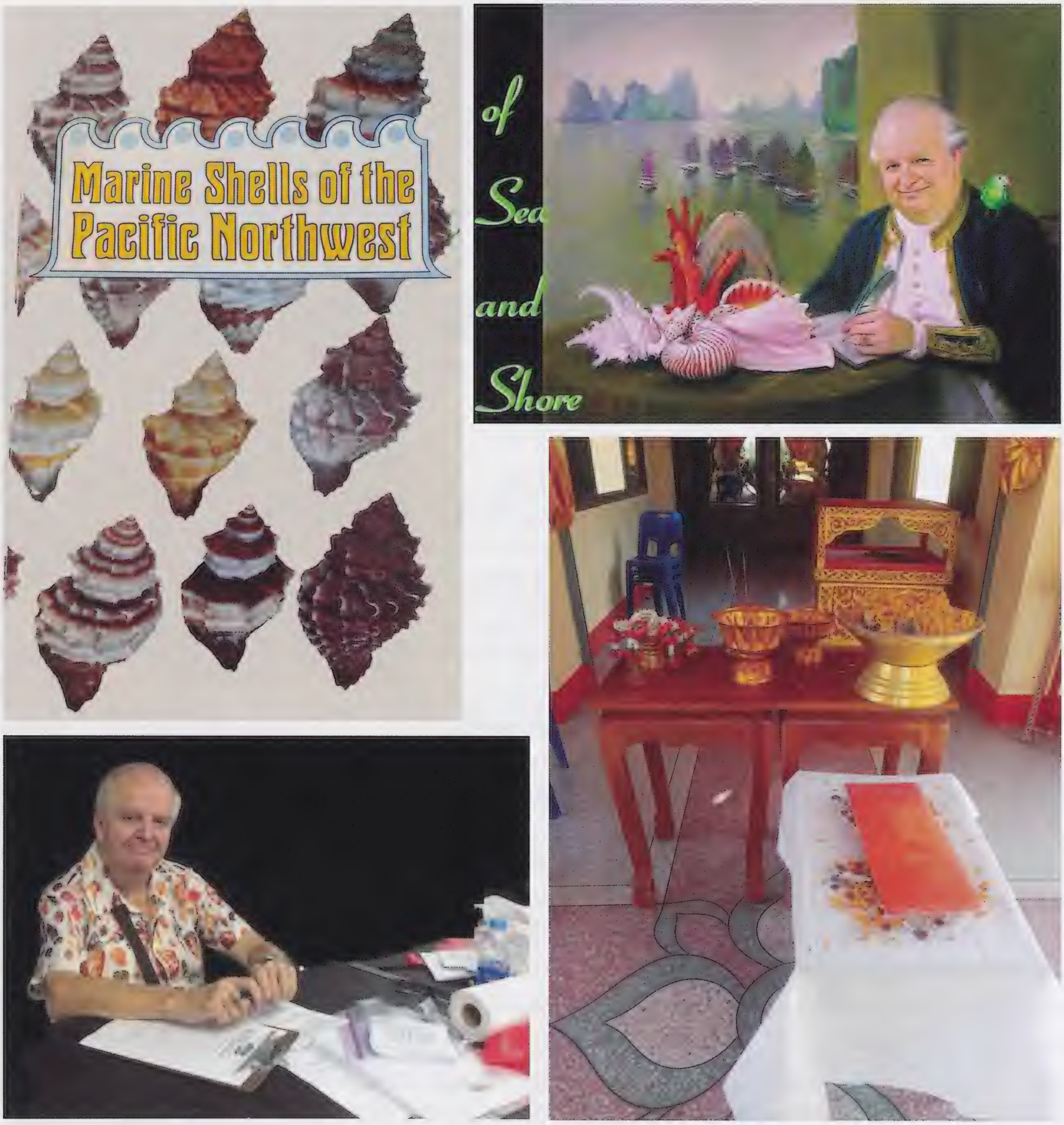
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E. adansonianus adansonianus (Crosse & Fischer, 1861),Bahamas, 106.1 mm. *B. poppei* (Anseeuw, 2003), Tonga Islands, 58.8 mm. *P. amabilis* f. *maureri* Harasewych & Askew, 1993, USA, 42 mm. *B. tangaroana* (Bouchet & Métivier, 1982), New Zealand, 55.9 mm. *P. quoyanus* (Fischer & Bernardi, 1856), Curaçao, 50.7 mm. *B. philpoppei* Poppe, Anseeuw & Goto, 2006, Philippines, 65.1 mm. *B. charlestonensis* Askew, 1987, Martinique, 77.3 mm. *B. midas* (Bayer, 1965), Bahamas, 82.7 mm.

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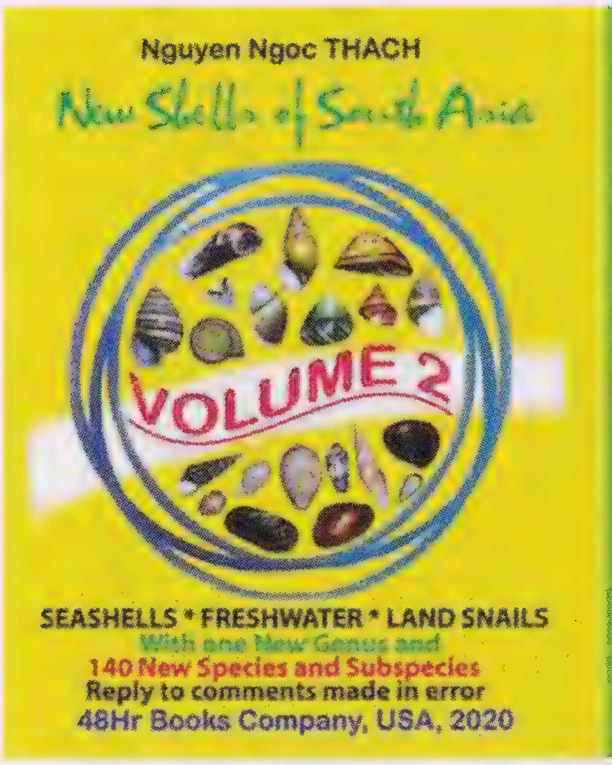
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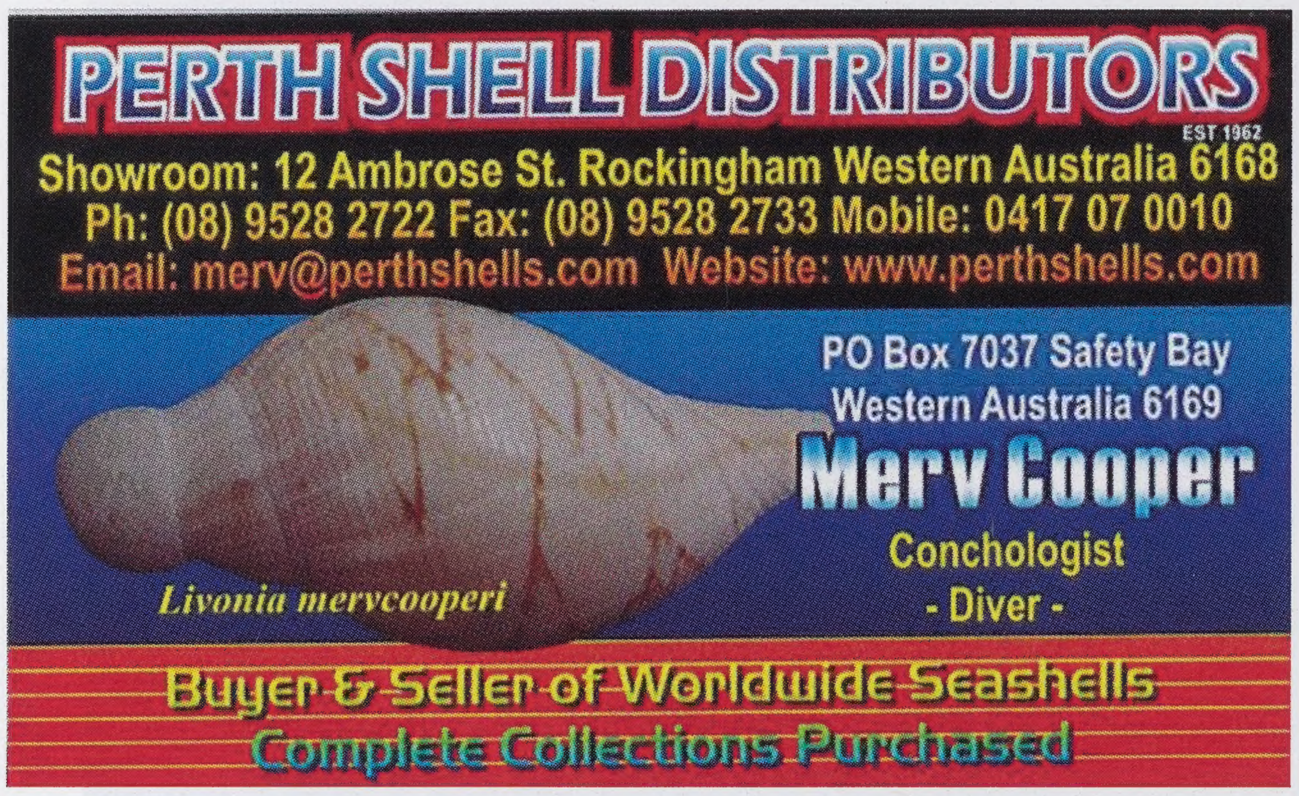

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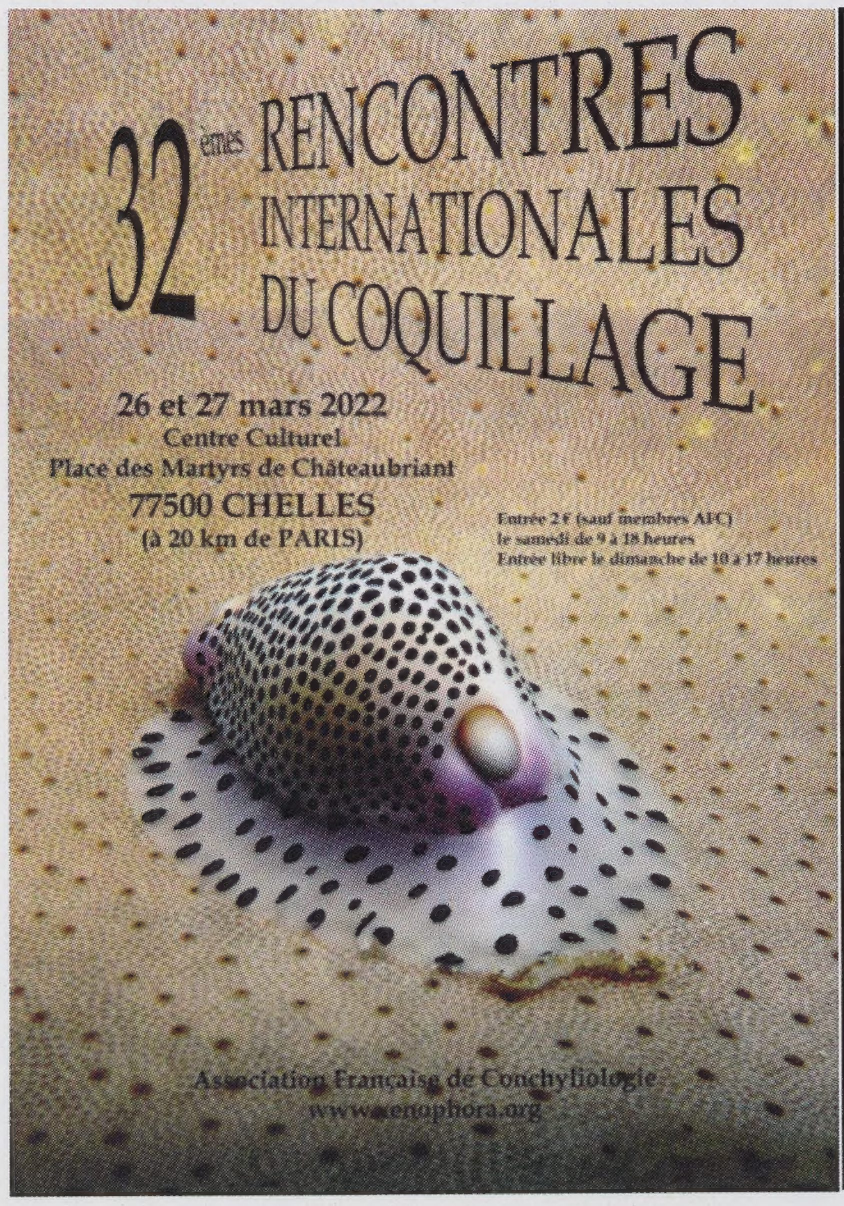
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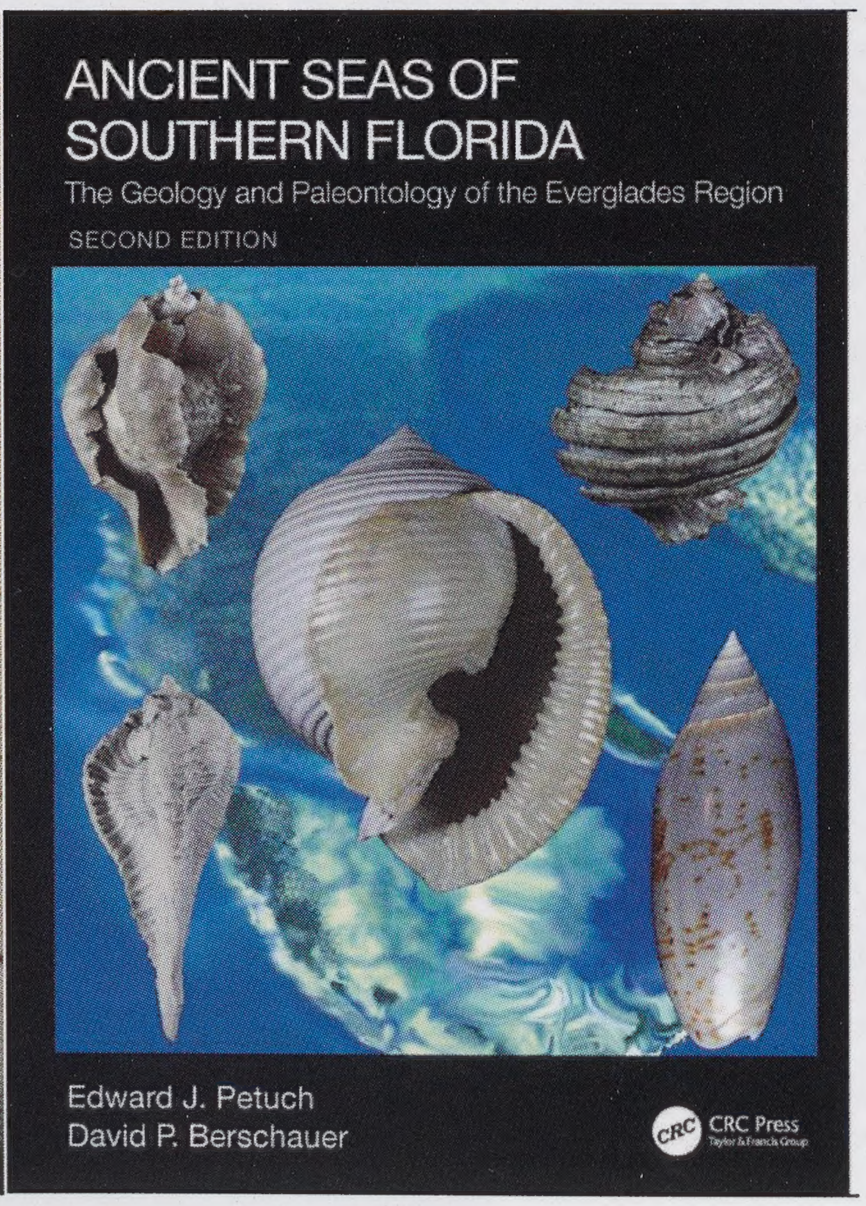
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